The
Electrical Review

VOL. CXIII. SEPTEMBER 1, 1933 No. 2910.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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The Perennial Problem

WE do not know when the trouble first began; we certainly cannot see any signs of when it is likely to end. We refer to the criticisms mutually offered by technical and commercial men on the subject of management.

The business incapacity of technical men is as old a topic amongst commercial men as is that of the ignorance and want of vision of directors and managers amongst engineers.

As already pointed out, the matter has a very practical bearing upon the efforts that need to be made to secure greater commercial success in electricity supply. Some borough engineers have grown in commercial efficiency with the progress of their undertakings, but where an engineer is so constituted temperamentally that it seems as though he never will grow, and perhaps never have a desire to do so, there is trouble in store. It is not to be supposed that our new measures for electricity supply expansion can be a complete success unless there is a universal will toward progress.

If an engineer is not by nature constituted to encourage the fullest possible commercial development of his system, somebody else must take charge of that side of the business. He must hand certain duties over to a suitable commercially-minded man and either run in double-harness with him or, at any rate, show close co-operation.

With certain variations, governed by the circumstances of the case, these remarks are applicable to industrial manufacturing businesses where directors or proprietors should have the complete co-operation of men who possess qualifications—either technical or business—which they themselves lack.

The encouragement that is being given to graduates of the Institution of Electrical Engineers to qualify optionally in engineering organisation, management and economics is referred to in interesting detail in the article by Mr. H. N. Munro appearing on a later page of this issue. The facilities that are now available for gaining knowledge and receiving training in business management are also particularised.

Experience has sometimes suggested that managers, like poets, are born not made, but there have been many examples of young men whose original pursuit was a technical career becoming valuable in service to the industry, and better engineers, too, because at an early stage in their preparation for life they found occasion, or were forced by circumstances, to apply their minds to the optional subject which will next year form part of the I.E.E. graduate examination.

Does it not seem desirable that some adaptation of the "sandwich" system of alternate periods of works and college training should be introduced, permitting the broadening influence of business training to come into play? Further, why cannot the young man who in preparing himself for commerce or industry is devoting several years to the study of business administration, economics and so forth, be afforded an opportunity to sandwich in with such study some practical experience in an actual industrial or commercial business?

The arrangement of actual "cases" of business administration for analysis and study goes some way in this direction, but with the organised co-operation of business firms much more might be done in this direction, thus providing a constant stream of young men fully qualified to embark upon a career beneficial alike to industry and to themselves.

The British Association in 1907

WHEN the British Association is in session at Leicester next week memory will irresistibly take some of us back to the visit which the Association paid to the same city twenty-six years ago. All B.A. meetings were of electrical importance in those days, and that assembly was one of remarkable brilliance from the personal point of view. Two items in the programme stand out lastingly from the rest. One was the masterly address delivered by Prof. Silvanus P. Thompson as chairman

of the Engineering Section. "S.P.T." has never been equalled as an orator in the electrical world. He took a great theme—the development of the material resources of civilisation, and the dependence of the whole upon Science directed mainly by the engineer. Both in matter and in manner it was great! The other item was a battle royal on the constitution of the atom fought in a record meeting of the Mathematical and Physical Science Section. The occasion still lives in the minds of many who were present; this is not to be wondered at when the speakers are recalled—Prof. (now Lord) Rutherford, Sir Oliver Lodge, Sir William Ramsay, Prof. J. Larmor, Mr. F. Soddy, and, last of all, Lord Kelvin. The reception accorded to Kelvin as the frail white figure, hitherto silent, rose in the centre of the platform, leaning upon his stick, and spoke with his old courtesy and fire is not a thing soon forgotten. It was the last B.A. meeting he ever attended. One almost wanders in another electrical world as one recalls that others taking part in the last Leicester meeting included Sir William Preece, Prof. Andrew Jamieson, Robert Hammond, Dugald Clerk, Prof. Bertram Hopkinson, Dr. Duddell, Mr. Worby Beaumont and others not now with us.

This Year's Meeting

CONTINUITY is preserved at this year's meeting by Lord Rutherford who is to review the past quarter of a century's work on atomic transmutation, and other physicists who will be prominent are worthy successors of a group of great men. In Section A the discussion of the nature of matter will be continued, and many ingenious electrical methods of studying electrons and protons will be described. This year's president of the Engineering Section (Mr. R. W. Allen, C.B.E.) will discourse on experiences in mechanical engineering. Electrical engineering is not very well represented; the sectional programme, as printed, includes only one specifically electrical paper, that by Mr. W. Wilson on switchgear testing, although Prof. Miles Walker will deal with important electrical projects in the course of his paper on "Great Engineering Works of Profit as a Cure for Unemployment." In the Physiology Section the subject of variations in skin resistance to electric currents will be discussed, and an ingenious method of employing neon lamps to time competitive reactions will be described.

An Alternative Severn Scheme

THE pumping of water during times of light load to be used for producing electricity to meet the peaks is the subject of an article contributed by Mr. J. W. Meares to *The Times* and of a leader in that journal. The proposal is made as an alternative to the construction of a Severn barrage, and its technical basis was discussed by the author in our issue of May 5th. The peak load on the grid would be turned into a base load by the full utilisation of stations scheduled for single and two-shift working under the grid scheme; these would drive the pumps as an off-peak load. In practice probably much of the pumping load would be transferred to the most efficient stations, as these would have their own times of relatively light load. We should expect it to prove more economical to extend these, if necessary, to deal with any long-hour load rather than to run secondary stations, whose only virtue is that, as the capital charges have to be met, the relatively high operating costs are unimportant at low load factors. The comparison is one between the operating costs of the more inefficient steam stations and the capital charges on the reversible turbine pumps. Possibly the Severn barrage committee has enough data available to give an opinion on *prima facie* grounds.

Brightening our Windows

WE suppose that more ingenuity goes into electric lamp propaganda than into any other form of electrical publicity, and it will be judged from an article on the subject in this issue that the lamp manufacturers are sustaining their reputation this season. Lamp retailers are offered a bewildering choice of display material for their windows and counters full of colour and brightness. We would like to see this intensive and attractive method spread over a wider field. Of course special window displays relating to cookers, refrigerators, and other appliances are not unknown, but there is a wide scope for further efforts in this direction—efforts which we believe would prove profitable. The model window layouts suggested month by month in the E.D.A. programme are often very good and not too expensive, but a greater choice is desirable. Electrical retailers' windows are too often like a street-market stall; they need the attention of experts whose services are probably too expensive for the small man but quite a small item to a firm of national standing.

Electrical Progress in Mines

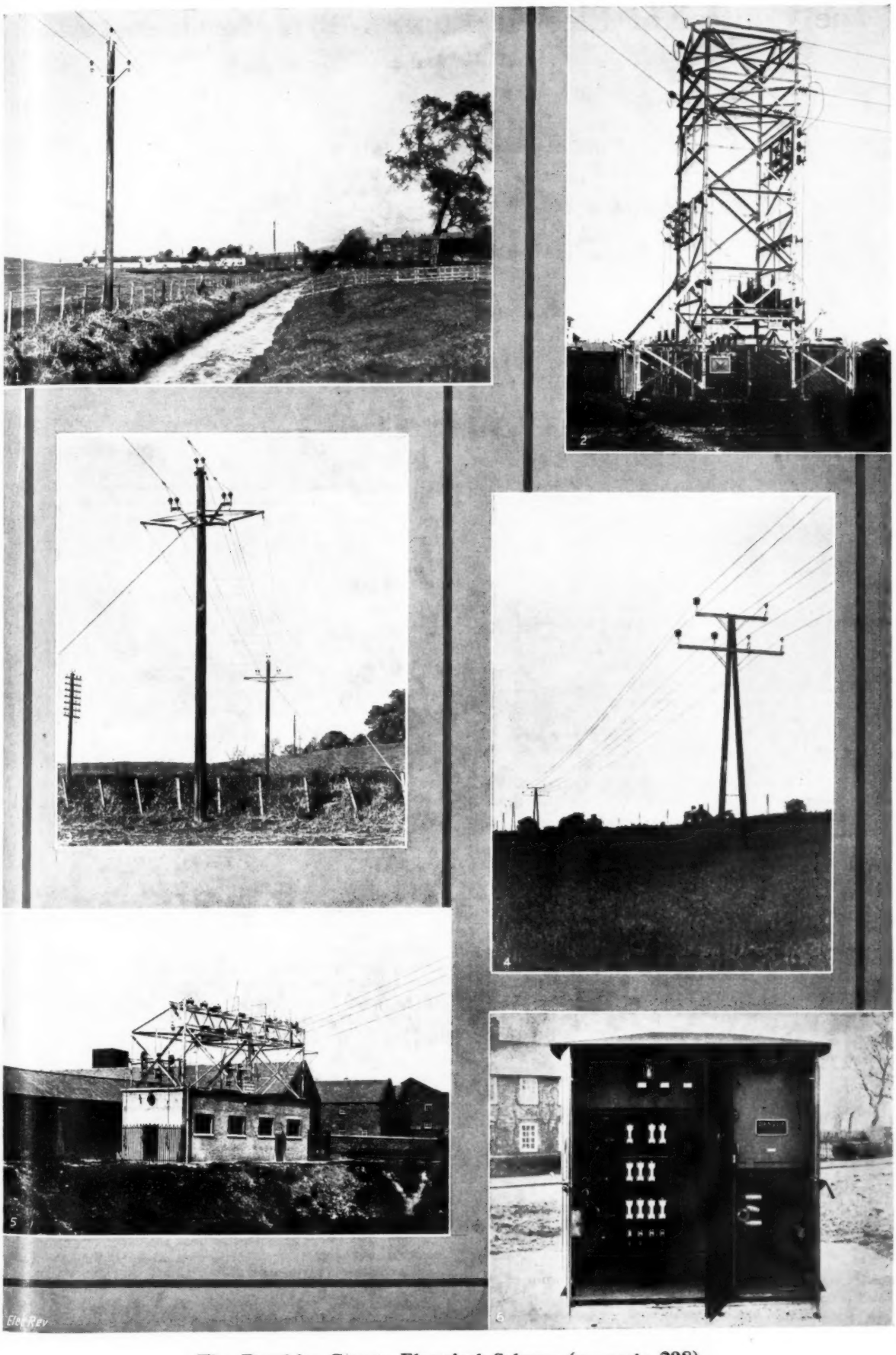
THAT a falling-off in business need not bring about a decrease in the use of electrical apparatus is shown in the report for 1932 of Mr. J. A. B. Horsley, Electrical Inspector of Mines. In spite of the reduction in the number of mines at work last year, the horse-power of electric motors installed increased by 22,000, while the amount of machine-got mineral increased by over 3½ million tons, almost all obtained by electrically driven plant. There was an appreciable decline in the number of coal-cutters in use, but nearly 80 per cent. of these were compressed-air driven. The report contains the only official list of the eighty types of flameproof electrical apparatus that have been tested and certified by the Mines Department during the year. The publication of the electricity report as a separate document is a most commendable practice. This procedure was adopted for the recent report of the Electrical Inspector of Factories for the first time. We hope it will be continued, as the electrical work is now much too big to be regarded as a subsidiary.

What Will Happen Next?

THE new Edison Electric Institute, U.S.A., recently prepared and presented a Code on behalf of the electric light and power industry to the National Recovery Administration. Two important independent organisations resigned their membership in consequence, but changes in the situation take place with such rapidity during this lightning drive that to state with accuracy the resultant position of these two organisations if they do not conform to a code is impossible. They are already State regulated enterprises, and they refuse to concede that utilities are "codable." They approve of the President's plan for increasing employment, but wonder where they are going to recover the increased cost of benefiting a few employés without passing it on to hundreds of thousands of consumers. Last month the magazine publishers submitted a code for their own industry and signed the President's agreement. Evidence to this effect is found in the statement that "The *Electrical World* now bears the Blue Eagle"; it carries on its cover that mark of membership of the N.R.A. with the words "We do our part." It is reported that many enrolled employers are experiencing difficulty in meeting the increased wage costs, and that Mr. Roosevelt has directed the chairman of the Reconstruction Finance Corporation to prepare a scheme for extending temporary credit through the banks. This is the last week of the intensification drive, and what is going to happen will happen!

No Dispute

IT has been suggested in the daily Press that lack of agreement regarding the system to be adopted is holding up railway electrification in this country. That can hardly be the case; electrical engineers expressed their views in 1927 through the Ministry of Transport Railway Electrification Committee, which recommended 1500 V, d.c., for overground working. This system has been introduced on the Altrincham line of the L.M.S. and on the Southern Railway



The Dumfries County Electrical Scheme (see page 298)

1. A typical three-phase .05 sq. in. s.c.a. single-circuit line of which 216 miles has been erected. 2. The Gretna main sub-station showing a Central Board 33-kV terminal tower. 3. An 11-kV single-circuit line crossing Post Office wires. 4. A typical double-circuit, 11-kV and 33-kV line interconnecting the principal sub-stations. 5. The Annan main sub-station controlling two 33-kV circuits, six 11-kV circuits and local transformers. 6. One of the twelve kiosk sub-stations used in towns.

The Control of Electric Pumps. By F. Johnstone Taylor

Methods of automatic and remote operation

ONE of the virtues of the electrically driven pump, and more particularly the centrifugal type, is the facility afforded for automatic and remote control. In the case of a small pump for basement drainage and similar duties, the equipment may involve nothing more than a simple float switch that puts the pump into operation when the water in the sump rises to a certain level and stops it when it has reduced that level to normal. The only proviso in such

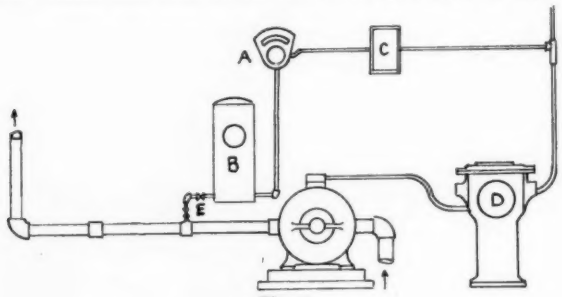


Fig. 1

cases is that the pump shall be either below suction level, or of the self-priming class; neither arrangement presents any appreciable difficulty.

A typical instance is the case of sewage pumps. They are quite frequently of the vertical-spindle class arranged for gravity suction and two or three can be so laid out as to come into and go out of operation in sequence according to the level in the suction tank, and so give adequate protection against sewage backing up in the sewers due to flood water.

At the same time, such obviously simple equipment may not always suffice and there are several other conditions which may enter into the problem. A more or less straightforward duty quite often met with is that of pumping up tanks and keeping the water level constant in them within about a foot. A lay-out of this class is shown in fig. 1. It incorporates an altitude regulator A and a cushion tank B, a relay C, and an automatic starting compensator D. The pointer of the altitude gauge actuates the relay and controls the starting and stopping of the pump when it engages two contacts which are set at the desired low and high pressures. These low and high contacts may be set at the maximum distance apart of 2 per cent. of the scale length.

A pressure gauge of the Bourdon-tube type may be arranged to perform the same electrical function as an altitude gauge, though it is not as sensitive. The relay takes the form of a

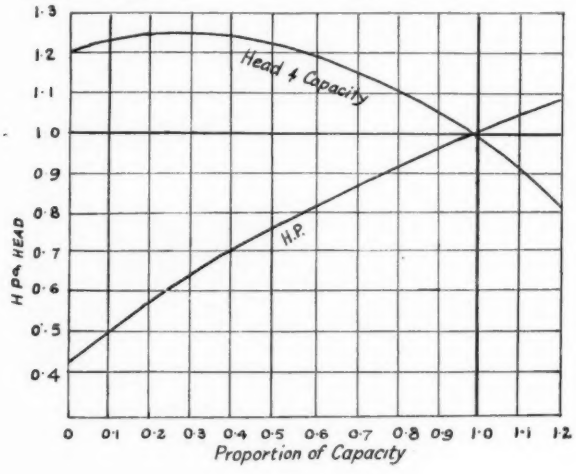


Fig. 2

small magnetic contactor, the coil circuit of which is handled by the contacts of the gauge while the main contacts deal with the main circuit of small motors or the control circuit of large ones. The purpose of the cushion tank with its valve E is to provide time lag between the actual and recorded pressures and so prevent "hunting."

Appreciable Economy Effected

Normally the provision of equipment dealt with in these notes is for the purpose of eliminating attendance, but when the duty of the pump is variable there is also an appreciable saving of power. An attendant in charge of an ordinary pump is likely to throttle the discharge at times of low duty so as to be able to run the pump continuously and so save himself a good deal of bother starting and stopping it. The typical curve reproduced as fig. 2 shows that at 50 per cent. of normal output the average centrifugal pump develops a head 1.21 times greater than its normal head, so that in order to reduce the capacity 50 per cent. the normal head must be increased 21 per cent., and in the case of the usual constant-speed set this can only be done by throttling.

The curves further indicate that at one-half its normal capacity the average pump requires 0.75 of the power needed at full capacity. At half-capacity it should only require one-half of the power used at full capacity, but since three-quarters of the normal power is demanded, obviously one-quarter is wasted by throttling. In other words, a pump running throttled at half-capacity requires 50 per cent. more power than it should do. The saving in power therefore by installing automatic control is obvious. Admittedly certain conditions can be met by an adjustable speed motor, but this adds appreciably to the cost of the installation. It is also

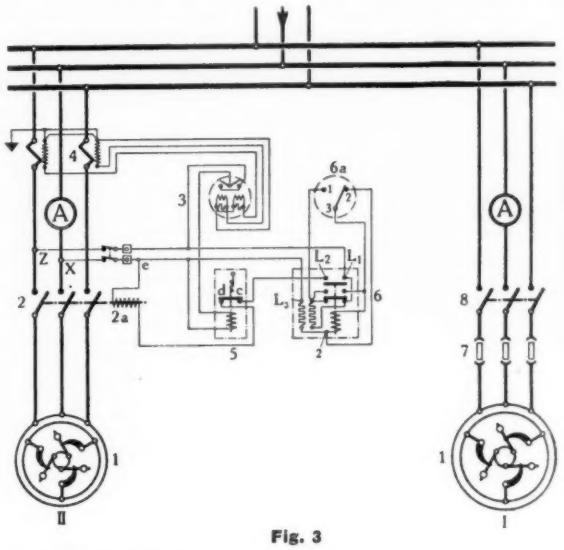


Fig. 3

I. Set for large outputs, hand controlled. II. Set for small outputs with automatic control. 1. Three-phase motor, with centrifugal starter. 2. Three-pole contactor. 2a. Magnet for 2. 3. Two-pole maximum-current relay. 4. Current transformer. 5. Interlocking relay. 6. Pressure switch. 6a. Contact manometer. 7. Fuse. 8. Three-pole hand switch.

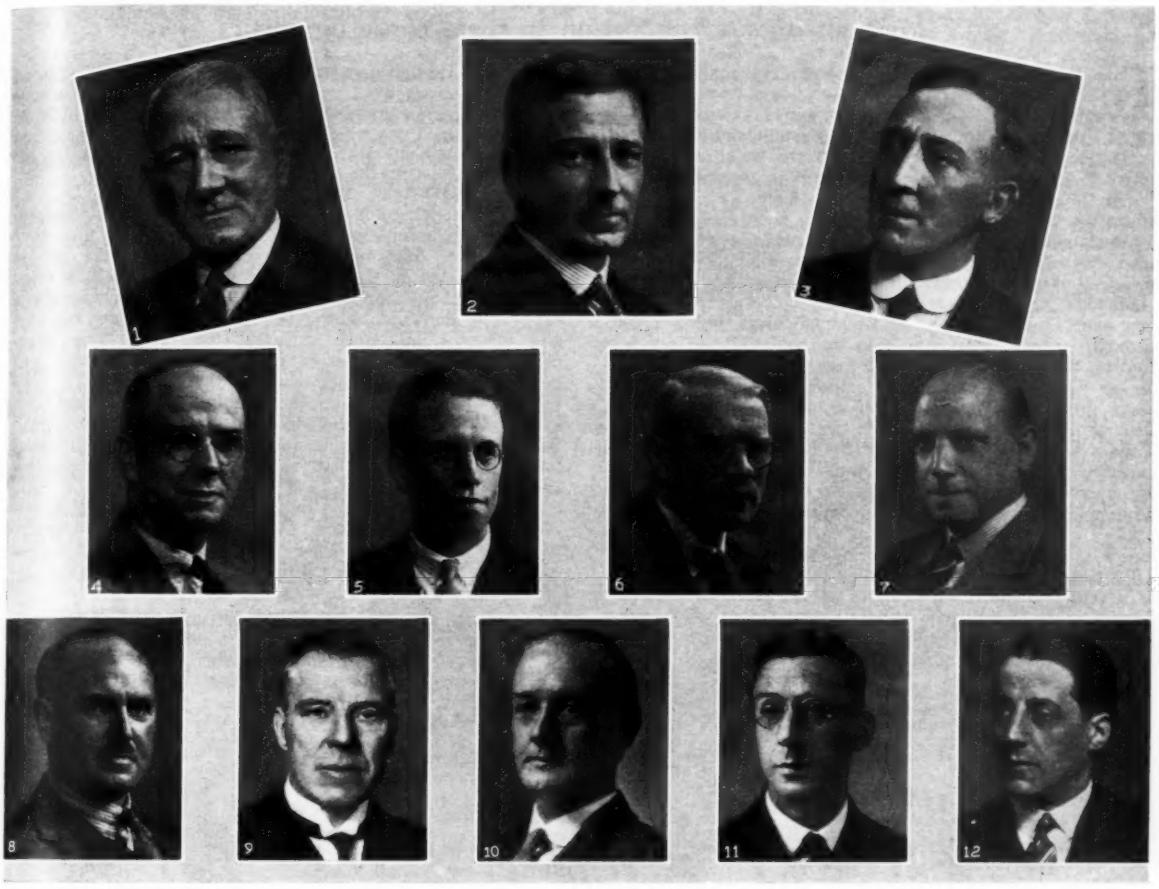
possible to admit air into the suction, but, while this takes less power than throttling, it is one of the potent causes of internal corrosion, and especially is this the case when the water is acid laden. It is not a practice to be recommended.

Reservoir Pumping

In the case of small waterworks, whether for public or private supplies, the water level in the reservoir is normally the controlling factor in the operation of the pumps, which may be some distance away. For moderate distances there will not usually be any difficulty in having lines between the reservoir and the pump house to operate a distant level recorder, which then becomes to all intents and purposes a float switch.

Fig. 3 is a typical diagram of connections for a plant of this class (Messrs. Brown, Boveri), incorporating two two-pole motors of different sizes. They are fitted with centrifugal starters and connected to a three-phase supply. When the index of the contact manometer is in position 1, which represents the smallest permissible water pressure, the circuit of the coil 2*a* of the contactor 2 is closed over the points Z, L1, L2, *c*, *d*, *e*, and X because the coil of the pressure switch 6 receives current by way of X, L3, 2, 3, 1, L1, and Z, thus short-circuiting the contacts L1 and L2 on the pressure switch, so that the contactor closes the circuit. The contactor can only be switched out when the circuit of the coil of the pressure switch 6 is short-circuited at the points 2 and 3 on the contact manometer, whereby the core of the pressure switch is released and the circuit of the contactor coil 2*a* interrupted. Should the over-current relay 3 operate from any cause, the interlocking relay 5 will be energised and the core remain

Some Driving Forces in the Industry: Switchgear and Cowans, Ltd.



1. Mr. J. Sermon, director, secretary, and joint manager. 2. Mr. L. A. Waller, chairman and joint manager. 3. Mr. G. H. Neep, director and technical manager. 4. Mr. G. Lounsbach, managers' assistant. 5. Mr. D. Firth, chief technical assistant. 6. Mr. E. D. Rodway, chief engineer. 7. Mr. S. H. Finney, chief of sales department. 8. Mr. B. E. Leeson, Manchester district office. 9. Mr. H. Turnbull, London district office. 10. Mr. F. Kirton, chief draughtsman. 11. Mr. J. Stockwell, works superintendent. 12. Mr. A. Manighetti, Birmingham district office. (*Nos.* 1 *to* 8, 10 *and* 11 *by Lafayette; Nos.* 9 *and* 12 *by Elliott & Fry.*)

The Control of Electric Pumps *(concluded from opposite page)*

suspended on the catch. The contactor cannot be closed again until the cause of the disturbance has been removed, after which the button of relay 5 is pressed, allowing the core to fall.

The impulses for switching the set into or out of operation are transmitted by controls from the float in the reservoir, or from a contact manometer in an air chamber. If local conditions render the erection of leads difficult, or if they become long and costly, it is possible to utilise the water in the pressure main for controlling the pump. The power required at the shaft of a centrifugal pump decreases considerably when it is running with the delivery main closed, and a float fitted in the high-level reservoir closes the discharge opening of the delivery main when the reservoir is full, so that the minimum-output relay in the motor circuit may be used to cut out the motor when the power decreases. This arrangement is suited to semi-automatic operation, which stops the pumps, but leaves the attendant to restart them.

Multiple Sewage Pumping Units

The division of low-lying urban areas into small districts served by air ejectors in underground chambers has proved an economical system in one respect, that is, in the saving of large low-level trunk sewers, but it is extremely wasteful of power and it has been virtually superseded by automatic pumping units. They are relatively simple sets, usually duplicate vertical-spindle centrifugal pumps under the control of a float switch, but supervisory control gear may be deemed necessary. Such an arrangement is in operation at Georgetown, British Guiana, in connection with twenty-four little pumping sets averaging about 15 h.p. Although the area served by each station is normally isolated, connections are provided so that, should a set be completely shut down, the sewage from the area affected will overflow into those adjoining. At each manhole a special entry switch is provided which switches on the lights and disconnects the signalling system, and an attendant, on leaving, has to restore this switch and thereby put out the lights and reconnect the signalling system. These sets comprise vertical-spindle centrifugal pumps in duplicate, and when the sewage rises sufficiently to put the second, or standby, set into motion an alarm bell is rung and a lamp lighted; the latter continues to glow until the float switch goes down or the set is visited by an attendant. This Metropolitan Vickers supervisory system is based on the Wheatstone bridge principle, and it is so designed that by means of automatic telephone-type relays and rotary switches the bridge circuit is maintained in balance. All the supervisory signals and telephone communication are effected through 0.001 sq. in. pilot wires and the stations are arranged in three groups, one wire being common to all the stations in each group and one additional wire run to each station.

Obviously, scores of different schemes can be worked out with the same object in view, which is the elimination of attendance charges in the first instance. But economical use of the power and possibly reduction of size of individual units are further means of reducing costs, while the element of safety is a valuable provision.

Positive X-rays

The X-rays found by Röntgen in 1895 are produced by fast electrons (negative projectiles) at a few thousand volts. "Positive" X-rays, *Science* states, have now been produced by Dr. W. M. Coates and Prof. E. O. Lawrence, of the University of California. They have observed that on stepping up mercury (positive) ions to 1,000,000 V and allowing them to strike targets of various elements X-rays are given off. At present there is no prospect of better and cheaper X-rays being derived by this method, as a positive ion produces approximately the same quantity of rays as a 10,000-V electron.

Current Transformers. By G. W. Stubbings, B.Sc., A.M.I.E.E.

Methods of interconnection in three-phase circuits

THREE current transformers are required for the protection of a three-phase circuit supplied from a system with an earthed neutral, as an earth fault current can appear in a single faulty line without simultaneously appearing in one of the other lines. From the point of view of metering it is most convenient to connect the secondary windings of three such transformers in star formation, and when this is done a connection must be run from the star point of the transformers to the common connection of the external secondary circuit, to provide a low impedance path for a secondary current corresponding to an earth fault.

Complete protection for the circuit is obtained, either by three overcurrent relays, or by two such relays, together with an earth leakage relay connected in the lead from the star point of the transformer secondaries. If the current transformers are connected in delta, instead of star, two relay elements only are required. The effect of the delta connection is to eliminate the zero-sequence component of the currents in the external circuit, so that the conditions in the external four-wire circuit when an earth-fault current is flowing, are reproduced in the three-wire secondary circuit proceeding from the delta-connected current transformers.

The delta connection is essential for the differential protection of a star-star power transformer when the neutral point of the secondary side is earthed, as in this case it is possible for a zero sequence component to appear in the currents on one side of the transformer without a corresponding component on the other side. An external earth-fault current will therefore set up an unbalance in the secondary system of star-connected current transformers, due to the unbalanced zero sequence component in the main circuits. The delta connection of the current transformers on both sides of the power transformer eliminates the zero sequence component, so that balance is always preserved with faults external to the transformer.

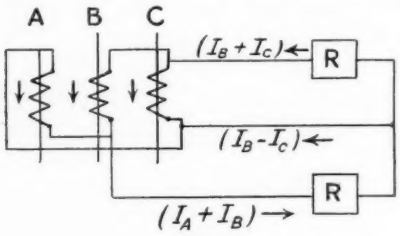


Fig. 1

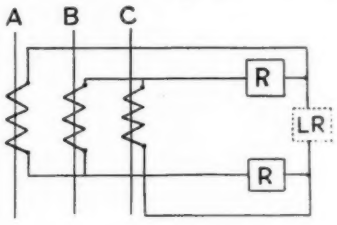


Fig. 2

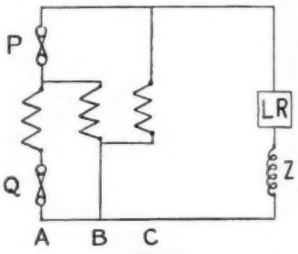


Fig. 3

The delta connection of current transformers is not very convenient as the currents in the three wires proceeding from the delta do not correspond in magnitude or phase with the main currents. Full rated current in the primary circuits gives a current of 8.66A in the relay circuits if current transformers of normal design are used.

The " Z " Connection

The well-known " Z " connection was evolved with the object of providing a circuit which would have the advantages of the delta connection, but in which the currents in the relay elements would correspond to the line currents so long as the external load was approximately balanced. This connection is represented in fig. 1, from which it will be seen that the relays each carry a current which is equal to the resultant of two line currents. Two relays will therefore give complete protection, and with a balanced load, each relay current corresponds to a line current.

The third external lead of the " Z " system of connection carries a current which is the difference of two line currents, and the magnitude of this current is 8.66A at full load. This difference between the current in one of the leads and that in the other two is not altogether a disadvantage, as it provides a simple criterion for determining the leads in which the relay elements should be connected.

Fig. 2 shows a modified " Z " connection, in which, as each of two relay elements carries a resultant current, these two relays will give complete protection to the circuit. With this circuit a sensitive leakage relay can be added at any time when deemed desirable. Having the three relays there is a standby protection given by the overcurrent elements in case of failure of the leakage element, whereas, with the ordinary star connected secondary circuit, the leakage relay is the only protection against earth faults in the line for which no overcurrent element is provided. The disadvantages of the circuit shown in fig. 2, as compared with the normal " Z " connection, are that four leads instead of three have to be taken from the current transformers, and that there is no simple test, by measurement of the secondary currents, by which the identity of the leads which should be connected to the relays can be determined.

Overload and Leakage Protection

The circuit shown in fig. 2 can be used to obtain complete overload and leakage protection by the use of a single relay and two time limit fuses. The connections for this scheme are as shown in fig. 3. Here P and Q are the time limit fuses, and LR the relay connected so as to be responsive normally to earth fault currents. This relay should either have considerable inherent impedance or should have an external impedance Z connected in series with it as shown. Earth fault currents will pass immediately into the leakage relay, those in lines A and B also passing through the time limit fuses. The leakage low setting of the leakage relay and the considerable burden thrown on the current transformers by the relay impedance will ensure that the relay operates before the time limit fuses are blown.

With regard to currents due to short-circuits between lines we see that if either A and C, or B and C are involved, one of the time limit fuses will be blown and the current for the transformer in the C line will then be diverted directly into the leakage relay. When the short-circuit is between lines A and B, the fuse Q will first be blown, and the current from the B transformer will then be diverted through the fuse P into the leakage relay. The effect of the impedance in the leakage relay circuit, together with the inherent time lag of the fuse will ensure the operation of the relay before the action of the fuse. Ordinary symmetrical overloads will, of course, result in the blowing of one or both of the fuses, and in either case a current will be diverted into the leakage relay, which will operate after a time lag from the incidence of the overload which depends upon the characteristics of the fuses.

It is possible to devise an arrangement of time limit fuses and a leakage relay for giving complete protection using current transformers connected in the usual star formation. With this arrangement special precautions have to be taken to deal with conditions in which two of the fuses might blow simultaneously. In the arrangement shown in fig. 3, there is no possibility with short-circuits of heavy currents appearing simultaneously in both fuses. The only such possibility is with an earth fault on line A, and in this case the heavy burden imposed by the leakage relay will limit the secondary current and ensure the operation of the relay.

Lightning Investigation in South Africa

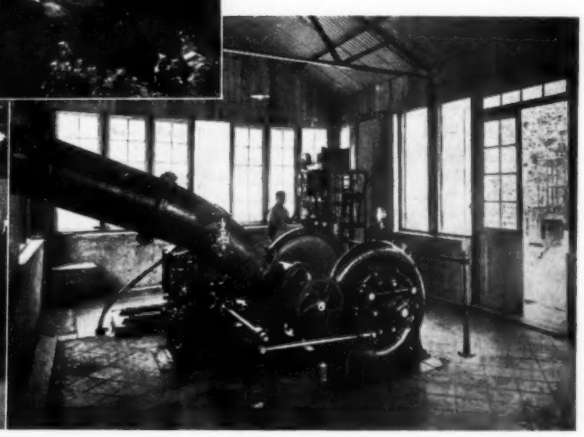
THE South African Institute of Electrical Engineers has set up a Lightning Investigation Committee. The formation of this committee arose out of the Institute's realisation of the fact that certain areas of the Union of South Africa are among the most dangerous in the world from the standpoint of prevalence and severity of lightning storms, and serious damage is caused by lightning. A section of the work of the committee is the compiling of statistics relative to the fatalities and damage from lightning occurring in the Union. During the past two lightning seasons, from October, 1931, to April, 1933, there were 167 recorded cases of damage caused by lightning, while on 58 occasions fatalities to human beings were recorded by the public Press, involving the loss of 96 lives. The Institute has recently made an appeal for funds in order to forward this work, and the response in monetary assistance from the Chamber of Mines, the Electricity Supply Commission, the Victoria Falls and Transvaal Power Co., Ltd., and the Associated Scientific and Technical Societies of South Africa and the larger municipalities, has been most encouraging, and a sum of approximately £500 is now available for the initial stages of the Institute's programme. The work of the research section of the committee is being carried out under the direction of Dr. Schonland.

Electricity on a Ceylon Tea Estate. By H. Crownshaw

TEA planting in Ceylon is mainly confined to the mountainous regions where the rainfall is plentiful and dependable. The result is that there are numerous available sources of water power. In the early days of the tea industry, and before that, when coffee was the staple product, the estate factory was built on a site with a reliable supply of water for power. At first water wheels were used, but these were followed by turbines and Pelton wheels working under greater heads. This naturally confined the factory to the valleys where the greater heads were available.

As the science of tea manufacture progressed it was recognised that better results were obtained where the factory was more openly situated and natural breezes, with lower temperatures, could be utilised for withering the green tea leaf. This resulted in sites for new factories being found on elevated ground, often without a supply of water for power. In such cases an oil engine was usually installed, but, at times, hydro-electric power was considered.

Owing to the high capital cost of the hydro-electric plant oil-engine installations have been more favourably looked on by estate managers. In some cases, however, conditions favour the hydro-electric plant and a definite saving in the cost of power is assured. Such a case occurred recently when it became necessary to build a new factory to replace an old one which had been destroyed by fire. The old factory was equipped with water-power plant installed many years ago, but recently modernised. A modern oil engine had also been installed to ensure ample power during the dryest weather. Fortunately, the engine and turbine were not damaged by the fire, so, when it was decided to build the new factory on a site more in line with modern requirements, these power units were available.



Top: A view of the estate and surrounding hills. Left: The power house and outdoor transformer. Right: The turbo-generator set

The site selected for the new factory is two miles nearer the railhead and at an elevation of about 3,500 ft. above sea level; that is, some 400 ft. above the old factory site. It was decided, therefore, to utilise the existing water-power plant by installing a generator, driven by the turbine, and motors in the factory. The 120-b.h.p. oil engine has been removed to the new site to act as standby in case of emergency.

The Hydro-electric Plant

The water-power plant consists of a Gilbert Gilkes turbine capable of developing 105 b.h.p. It works under a gross head of 110 ft., runs at 660 r.p.m., and is complete with an oil-pressure governor. The pipe line is taken direct from a small storage dam which is fed by an open watercourse, some three hundred yards long, from the main stream. Two other small streams also run direct to the dam, so, in dry weather, all the available water can be collected.

A Lancashire alternator of 85 kVA, running at 1,000 r.p.m., is driven through a Renold chain by the turbine. This machine has been designed to safely withstand the runaway speed of the turbine. As a further precaution, in case of failure of the turbine governor, an overvoltage relay is provided. This is arranged to trip the oil switch and also open the exciter field-breaking circuit-breaker in the event of the pressure between phases exceeding 500 V. Generation at low voltage was decided upon because of the very severe electrical storms experienced in this district.

The Crompton step-up transformer is of the outdoor type and is connected to the control panel by a short length of armoured cable. Its windings are arranged delta-star, the star point being earthed. Connection to the transmission line is made direct from the high-voltage terminals.

Stewart & Lloyd tubular steel poles have been used for carrying the transmission line wires. The three-phase wires and the continuous earth wire are of 0.025 sq. in. section h.d. bare copper, and the insulators are Henley's green-glazed type. The line passes over very broken country and the spans vary in consequence between 75 and 350 ft. Its design was simplified as ice loadings had not to be allowed for. Lightning protection is provided by choke coils and oxide-pellet-type arrestors, fitted in each phase wire, at each end of the line, and the continuous earth wire is earthed at frequent intervals.

In the Factory

At the factory end of the line two Crompton step-down transformers, of the outdoor type, have been installed. One is for power, having a capacity of 80 kVA, and its windings are arranged delta-star, the neutral point on the low-voltage side being earthed. The connections between the line and the high-voltage side are made through isolating switches of the air-break type. A further transformer (12 kVA) is also connected to the line through combined air-break isolating switches and fuses. Its windings are arranged three-phase on the primary and single-phase on the secondary; the secondary is arranged for 110 V at full load, tappings being provided on the primary. This special transformer is necessary to enable current for lighting the factory to be taken from the hydro-electric supply, or from an 11-kW d.c. 110-V generator, which is used when the factory is being driven by the oil engine. Its drive is taken from the lineshaft by chain, the chainwheel being mounted on a Benn clutch. Change-over from one supply to the other is effected by means of a switch on the lighting feeder panel.

Connections from the low-voltage sides of both transformers are taken into the factory by armoured cables to the feeder panels for power and lighting. Cables between the power feeder panel and motors are also of the wire-armoured lead-covered and paper-insulated type and were all supplied by Henley's. The line shafting throughout the factory is arranged for driving by the oil engine, to which it is connected in the engine room by friction clutch. A 60-b.h.p. Lancashire slip-ring motor is installed in the engine room and a chain drive transmits the power to the lineshaft, through a Benn clutch on which the chain wheel is mounted. Other motors are also fitted; three 10-h.p. squirrel-cage motors drive three pairs of fans, which are used for the withering process. The tea driers are driven by a 15-b.h.p. slip-ring motor which drives, through a chain, on to a short lineshaft. This motor is of the frame-cooled type as it works in a very dusty situation. When the factory is being driven electrically the shafting is disconnected at necessary points by clutches, which arrangement permits of a rapid change-over from electric to oil engine drive.

For lighting the factory and its outbuildings there are 285 lighting points, all wiring being done on Henley's "Nomet" system. On the ground floor, where the bulk of the manufacturing process is carried out, all lighting points are provided with Benjamin "R.M.L." reflectors.

Engineers and Management. By H. N. Munro, F.I.I.A.

THE recent announcement that after May of next year the examination for the graduate class of membership of the Institution of Electrical Engineers will contain, in Group 2, the optional subject of "Engineering Organisation, Management and Economics," has been received with not a little apprehension in some quarters, although generally it has met with approval.

We might divide the critics into three classes; those who maintain that the candidate is too young to be examined in a subject of this kind; those who hold that the syllabus embraces far more than can conveniently be grasped; and those who would make the subject compulsory instead of optional.

There is an adage about never being too old to learn, and there ought to be one which will encourage youth to learn while life is yet in its morning. The sooner a young man entering a profession, which is becoming as commercial as it is technical, knows about the responsibilities and the implications of a commercial life the more readily will he recognise his place in the industry and respond to its demands, however technical may be the job he ultimately hopes to secure.

[*Elliott & Fry*
Mr. H. N. Munro

Some engineers believe that the early years of a man's life should be devoted entirely to absorbing all he can about the technicalities of his profession, and that to intrude upon these technical studies with a course of purely commercial interest may distract and confuse him. But do they not miss the point that the engineer can only continue to exist so long as his skill, in whatever direction it may be, is translated into £ s. d. by those whose ability lies in the direction of financing, selling and managing? If a certain amount of training in management is taken during youth it does, at least, open his eyes to the problems of those outside the technical field, and it may fire him with the ambition to be both engineer and manager—a highly desirable combination, besides being a little more lucrative than one or the other.

At first sight the rather cumbersome and frightening title of the syllabus and the many subjects dealt with suggest an exhaustive rather than a superficial or introductory study. But studied along the right lines it demands no more than every engineer ought to know, i.e., the fundamental principles of business management which underlie the conduct and administration of every company, small and large.

Engineers and Managers

There has been, and doubtless always will be, discussion on the old theme, "Should engineers be managers?" but the decision of the Institution seems to imply that engineers can be managers. "But," says the critic of the third class, "Why not make the subject compulsory so that every engineer may get a knowledge of its fundamentals so that at any stage of his career he may be able to occupy a managerial position?"

The syllabus follows rather broad lines, but it depends on how far the engineer-manager of the future decides to travel as to how much of it he takes seriously. The point that we have to keep in mind all the time is how the industry hopes to develop. He would be a small man with a very small mind who would put the engineer on one side as having no place in the making of profits—the only thing which any business enterprise is constituted for—but there are such men, and occasionally they give forth some form of articulation which we come to understand as a plaint that the engineer is only an engineer, and should be kept in his little room. This is wrong! The electrical industry is, and always will be, a technical industry in the full sense of the term, but in its development it will be less concerned with what the engineer can produce than how much he can produce it for, how many people want it, or can be made to want it, and how they are to be found; then, how they are to use it to their advantage and to the advantage of the engineer, whose place in the economy of things compels him to produce something else, better or different, and so on *ad infinitum!*

We know that the thing of to-day is often obsolete to-morrow, not only because scientific progress makes it so, but because the people who use it are not content to use to-day that which they used yesterday. Almost every week adds its quota of things new or improved, and we are constrained to ask where it is all leading and what is the nature of the development which is expected of us, and how it compares with what we, ourselves, had planned.

It is on the efficiency of its management that every unit of the electrical industry, or any other, will depend for its technical progress. The question is whether a class of managers drawn from a non-technical grade shall dominate the technician to the point of suppression, or whether the managers of the future shall be recruited from the ranks of the engineers.

More Educational Facilities Needed

Our progress in the field of management, especially with regard to education and training, is lamentable compared with that of other countries, and it is due largely to the contempt—there is no other word for it—in which things commercial are, or were until quite recently, held. Commercial education always suggests to us shorthand and typing and keeping books, while if we call it by that unfortunate and ill-chosen term, "economics," we get hazy ideas of academic matters which only serve to bemuse and mislead us. "Business management," or "industrial administration," free from frills and high-falutin' and misleading terms, is really what we mean. Some of our universities and schools recognise the importance of the subject, and even at Cambridge University it has been felt that the regulations and syllabuses which exist for the ordinary B.A. degree are not consonant with modern requirements, and a scheme has been introduced by which the course of study leading to that degree will aim at fitting undergraduates for a business life.

We now have faculties or departments of commerce or management in London, Manchester, Dundee and a number of other younger universities and university colleges, while some course of business management is taught in many technical schools throughout the country, mainly, be it acknowledged, due to the progressive policy and foresight of the Institution of Mechanical Engineers, and the work put in by the Institute of Industrial Administration.

But that does not go far enough, no farther than does the merely optional subject in the I.E.E. graduate examination. The managerial function has got to be recognised, and managers of some qualification must be given a professional status similar to that of accountants, architects and engineers. The industry must respond to the need for better management by supporting the centres of management education, by enabling their employés to learn more about management, and by giving facilities to students of schools which will enable them to combine technical with management training. Some firms in the industry are doing much to help the London School of Economics both by financial support and by providing "cases" for the students to analyse and study. Some particulars of the new work that is being undertaken at the L.S.E. by Mr. Jules Menken in the Department of Business Administration were given in the ELECTRICAL REVIEW for August 11th, page 196.

There is little doubt that professional status will come the way of those who hold high qualifications in the sphere of administration and management, but the test of what we do and where we are going will be seen in the first batch of examination papers following the examination in this new I.E.E. syllabus.

The Public Lighting Conference

DURING the tenth annual conference of the Association of Public Lighting Engineers to be held at Margate from September 4th to 7th, the following firms have arranged to give demonstrations of the latest types of street and floodlighting: The General Electric Co., Ltd.: Five pendant fittings designed for the "Osira" electric discharge lamp, suspended from the arms of the tram poles in Fort Crescent; 500-W decorated units on existing columns on Fort Lower Promenade; 400-W "Osira" lamps in special louvred reflectors carried on span wires for floodlighting the lawns of the Winter Garden; 500-W "Osram" gasfilled lamps in silvered glass "Gecoray" dispersive floodlights for floodlighting the Winter Garden terraces; and gasfilled lamps for floodlighting the tower (115 ft. high) of Holy Trinity Church. The British Thomson-Houston Co., Ltd.: Six directional lanterns each fitted with a "Mazda-Mercra" electric discharge lamp, suspended from the arms of the tram poles in Athelstan Road; circular lanterns, each fitted with one "Mazda-Mercra" lamp, erected on temporary poles at the Rendezvous site; and floodlighting of putting green by means of "Mazda-Mercra" floodlights. Siemens Electric Lamps and Supplies, Ltd.: Four directional street lighting fittings designed for "Sieray" hot-cathode lamps fitted to temporary poles erected at the corners of the Jubilee Clock Tower, the illumination of the dials of the clock from the inside by means of "Sieray" hot-cathode floodlight tubes. The Engineering & Lighting Equipment Co., Ltd.: Decorative street-lighting units (two 200-W lamps in each) and 150-W units fitted with directional reflectors on the Fort Lower Promenade.

Ironclad Switch and Fuse Gear

THERE appears to be something for every purpose in the extensive range of ironclad switch and fuse gear for medium-current service recently introduced by the Simplex Electric Co., Ltd., Empire House, 159, Great Charles Street, Birmingham.

Non-weathertight switches, insulated for 500 V, are made in 15-, 30-, and 60-A sizes, and both d.p. and t.p. styles. The wiring arrangements are for direct connection into the switch terminals through the case top. A d.p. 15-A model in standard finish costs 4s. 8d. Weathertight switches (500 V), with a packed joint between the cover and the box, are available in 15-, 30-, 60- and 100-A sizes, d.p. and t.p. There are three wiring holes, fitted with knock-outs, at both top and bottom.

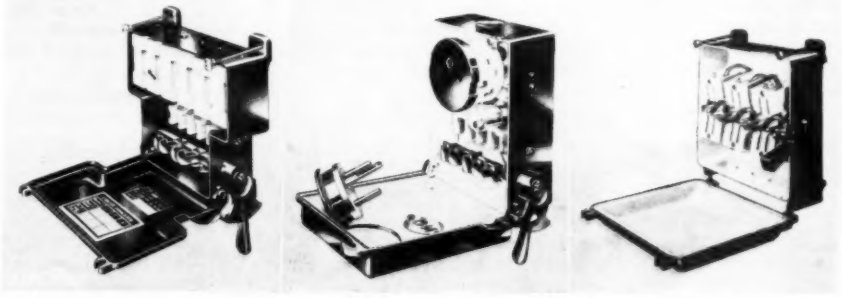
In the 100-A size the moving switch-blade carrying bar is duplicated as an additional safeguard, and the case is of composite construction, pressed steel and grey iron. A t.p. 100-A model in standard finish is listed at 47s. There are five types of switch-fuses, from "Junior" 250-V, 15-A, d.p. units to weathertight 15-, 30-, 60-, and 100-A, 500-V equipments, which are available in d.p., t.p., and t.p. and neutral models. The "Junior" switch-fuses are of non-weathertight construction, one type (5s. standard) having plain holes at the top and bottom for direct cable entry, while the other type (6s. standard) has spout outlets, tapped for screwed conduit or bored for "Terra-Grip" conduit.

A non-weathertight 500-V switch

A non-weathertight switch (9s.) suitable for house service work, has two 1-in. clearance holes fitted with wood bushes at the top. The fuse wire is located between self-cleaning, arc-quenching pads of ceramic material which protect the porcelain from damage during the clearance of a fault. Similar 500-V non-weathertight switch-fuses are available in 15-, 30- and 60-A sizes, d.p. and t.p. A 15-A t.p. model weighs 11¼ lb., measures 8¼ in. by 8¼ in. by 3¼ in. overall closed, and costs 12s.

A simple two-way, 15-A, 250-V splitter-type non-weathertight switch-fuse measures 7⅛ in. by 6⅜ in. by 3⅜ in. overall closed and costs 7s. 8d., while another unit of the same style, (8s.), has a slightly larger case and is provided with one spout outlet at each end for use with either screwed or "Terra-Grip" conduit systems. A 250-V, 15-A, two-way splitter with a 30-A switch (14s. 4d.) is designed for house-service work, while a similar three-way unit can also be obtained. The latter is listed at 18s. 4d. and weighs 7½ lb.

Among the cooker control equipment there is a simple 30-A d.p. unit with a pilot light illuminating a ruby lens and protected by a s.p. fuse; a unit incorporating a d.p. main switch and a 5-A non-interlocking switch and plug protected by a s.p.



Left: A 250-V, 15-A, 3-way splitter switch-fuse with a 30-A switch. Centre: Cooker control switch with automatic switch-operating plug. Right: Triple-pole change-over and off switch

fuse, in addition to a pilot light; a 30-A equipment with a 5- or 15-A combined interlocking switch and plug; and a similarly equipped outfit but with a 10- or 15-A s.p. automatic switch operating plug. A 15-A "Duplex" plug with a supplementary 5-A plug is an alternative arrangement for the last-mentioned equipment, which measures overall closed 6⅞ in. by 8¼ in. by 4⅜ in. and costs 28s. (15-A ordinary plug) in vitreous enamel.

A 500-V change-over and "off" switch, 15, 30 and 60 A, d.p. and t.p., is designed for changing over to emergency lighting in cinemas, &c., or to alternative metering at special rates. The d.p. 30-A model measures 7 1/16 in. by 10⅛ in. by 4⅛ in., and is priced at 13s. 8d.

Simple s.p. and d.p. non-weathertight cut-outs are designed for 15 A, 250 V, while 500-V similar equipments (s.p. only) are available in 15-, 30-, 60- and 100-A sizes. With composite weathertight cases, 500-V, 15-, 30-, 60- and 100-A cut-outs are available in d.p., t.p., and t.p. and neutral styles, a t.p. and neutral 15-A model costing 13s. 4d.

There are "Junior" d.p., 250-V, 15- and 30-A distribution boards in up to 12 ways, and combined switch and distribution boards, 250 V, with 5-A, s.p. switches and 15-A d.p. fuses, in up to 12 ways. The fusebanks of 500-V, 15-, 30s-, 60- and 100-A, d.p., t.p., and t.p. and neutral distribution boards are rigid, but so designed that they may be freely rotated to any position to facilitate wiring.

All the ironclad equipment referred to is suitable for building up into switchboard form, and with the aid of "Simplex" busbar chambers any form or size of panel can be constructed.

Various sizes of brass stuffing glands for armoured and unarmoured cables, and sealing chambers, with and without glands, complete the range of ironclad equipment. There are also available ranges of teak-cased and teak-framed distribution boards.

Large-current Furnace Transformers

FOR use in Soviet Russia the Siemens-Schuckertwerke of Berlin has recently supplied nine single-phase furnace transformers of exceptional current capacity. They are to be installed in the neighbourhood of the large Dniepr power station and supplied with power therefrom. Two furnace plants are equipped and comprise six and three single-phase furnaces of the Miguet-Perron type of 11,000 kW each for the production of carbide, ferrous alloys, and alumina.

According to the *Siemens-Schuckert Review* the transformers are for a continuous output of 11,400 kVA each at 36,750 V, 50 cycles. Their secondary potential is 25 to 55 V, regulation being effected in fifty-six steps under full-load conditions by means of load switches. The rated secondary current is 245,000 A, but overloads are permissible up to 270,000 A for 720 hours and 305,000 A for two hours. One of these units comprises a regulating transformer with coarse tappings, an intermediate transformer with fine steps, and the constant-ratio furnace transformer proper. These are contained in a common tank arranged for circulated oil cooling and provided with the usual protective gear. Each unit weighs approximately 50 tons, including oil.

The primary connections are made by means of cable trifurcating boxes at the side of the tank. Owing to the arrangement of the secondary conductors, which radiate from the top of the transformer in all directions, there was no room for high-voltage insulators. The secondary terminals consist of forty-eight water-cooled copper pipes of 2-in. outside diameter per phase, the conductors being connected up by means of flexible copper strips. The conductors are subdivided into twenty-four sets of bars of eight each (four per phase arranged concentrically) measuring about 6⅜ in. by ⅜ in. each. These sets of bars are arranged symmetrically in a circle beneath the furnace and are connected up to two concentric copper cylinders, which form the furnace tank. The inner cylinder is connected to the stationary electrode at the bottom of the furnace, whilst the outer cylinder is connected to the sliding contacts of the movable electrode, so that the inductive loop of the furnace is reduced to the minimum. An impression of the size of these furnaces can be gained from the fact that the movable electrode, which consists of a sheath of amorphous carbon and a core of pulverised electrode waste and filling material, has a diameter of 13 feet and weighs 100 tons.

The connection of such large single-phase transformers individually to the supply would give rise to large out-of-balance voltages in the system. Three transformers are therefore always connected up together, or two in Scott connection.

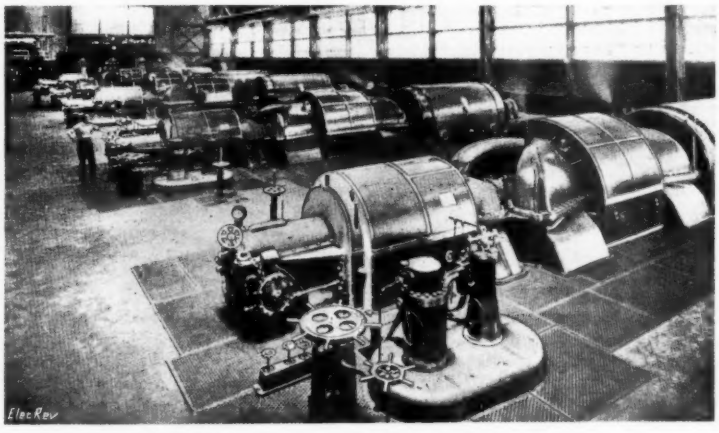
Progress in South Africa

The report of the Electricity Supply Commission for 1932

THE tenth annual report of the Electricity Supply Commission of South Africa covers its operations for the year ended December 31st, 1932, and gives a brief review of its activities up to April 30th, 1933. In spite of adverse trade conditions the total sales of electricity increased by 2.73 per cent. to 890,735,162 kWh, but there was a decline in the Natal Central and Sabie undertakings, due to the falling off of railway traffic and shortage of water, respectively. The distribution of the kWh (in thousands) sold during 1932 as between the various classes of consumers was as follows :—

Undertaking.	Traction.	Bulk supplies.	Industrial and mining.	Domestic and lighting.	Total.
Natal Central	82,316	14,986	2,653	337	100,292
Witbank	—	573,053	36,658	574	610,285
Capetown	30,142	18,239	15,156	732	64,269
Durban	—	109,809	—	—	109,809
Sabie	—	—	6,080	—	6,080
Totals	112,458	716,087	60,547	1,643	800,735

There were 2,236 consumers in a supply area of 11,000 sq. miles, and the capital expenditure at the end of the year was £8,411,667. Sales for the first four months of the current year show an increase over the corresponding period of 1932. The total revenue was £1,095,181. Traction supplies (converted to d.c.) at an average rate of 0.868d. accounted for 37.6 per cent. of revenue received from sales of electricity (£1,083,602); bulk supplies at 0.179d. for 49.4 per cent.; industrial and mining consumers at 0.482d. for 11.2 per cent.; and domestic and lighting consumers at 2.898d. for 1.8 per cent. The percentage number of kWh sold to each class was: traction 12.63, bulk 80.39, industrial and mining 6.8, and domestic and lighting 0.18.



The turbine room of the Witbank power station

Eight local authorities at the Cape, two in the Transvaal, and eight in Natal took bulk supplies directly from the Commission, and many more indirectly. The total production costs (including all capital charges) amounted to £1,091,759 or 0.294d. per kWh sold, an increase of 0.008d. over 1931, due chiefly to the higher cost of coal. The percentages of these costs attributable to various items were as follows: coal, 22.2 (including 13.3 railage); oil, water and stores, 0.9; generation salaries and wages, 5.6; generation, repairs and maintenance, 5.8; distribution operation and maintenance, 3.7; local administration, 4.3; head office administration, 3.5; reserve for renewals, obsolescence, &c., 10.3; redemption, 6.8; interest, 36.9.

The five undertakings of the Commission with the millions of kWh sold in each case are: Natal Central, 100.3; Witbank, 610.3; Capetown, 64.3; Durban, 109.8; and Sabie, 6.0. The coal consumed at the four steam power stations amounted to 795,333 tons at 9s. 10d. per ton (2,000 lb.) for mixed smalls at Colenso, 2s. 4d. for duff, peas and round coal at Witbank, 24s. 11d. for peas at Salt River (Capetown), and 15s. 4d. for dross at Congella (Durban) where pulverised fuel is used. Omitting Witbank, where no appreciable railage was involved, carriage represented over 80 per cent. of the cost of coal.

Thermal Efficiencies

The technical fuel returns for the four stations gave the following results :—

Power station.	Per kWh sent out. lb.	B.th.u. per lb. of coal.	B.th.U. per kWh sent out.	Thermal efficiency (sent out).
Colenso	1.60	12,330	19,700	17.3%
Witbank	1.87	11,210	21,010	16.2%
Salt River	1.70	13,100	22,300	15.3%
Congella	1.50	12,710	19,000	18.0%

The load factors (per cent.), half-hourly maximum demands, and capacities of the stations were respectively: Colenso, 50.3, 24,240, and 60,000; Witbank, 77.3, 89,954, and 100,000; Salt River, 40.8, 18,279, and 30,000 (not including the two 20,000 33-kV units being installed and on order); Congella, 41.7, 30,000, 48,000 (not including a 20,000-kW unit on order); Sabie, 62, 1,160, 1,350.

The twenty-three turbo alternators installed included five of 25,000-kW capacity, eight of 12,000-kW, and three of 10,000 kW. There were two boilers of 100,000 lb. per hour (normal rating), sixteen of 70,000 lb., twenty of 60,000 lb., making thirty-eight in all.

The transmission lines and cables included 275 route miles at 88 kV, 250 at 33 kV, and 84 at 21 kV, out of a total of 752 route miles, of which 695 miles were overhead. Transformer capacity exceeded 385,000 kVA, and 66,150 kW of motor generators and rotary convertors were installed in nineteen sub-stations.

None of the five undertakings is connected with any of the others. The Natal Central primary transmission lines extend northwards to Newcastle and southwards to Cato Ridge, serving thirteen main sub-stations for railway d.c. supplies; there are also a number of subsidiary transmission lines and sub-stations. Several extensions are in hand or have recently been completed; for these the track structures of the electrified railway are being used to carry subsidiary transmission lines. The kWh sold in this area decreased by 0.03 per cent., but about 84 per cent. of the sales were for traction, which was responsible for the decline. To other consumers the increase was 6 per cent.; these comprise seven bulk supplies, twenty-four industrial and mining and 215 domestic and lighting consumers. The Capetown transmission system feeds five sub-stations on the Capetown-Simonstown line for the railway d.c. supplies and also distribution networks in the rural area eastwards of Capetown; consumers include five bulk, sixty industrial and mining, and 413 domestic and lighting. Salt River power station is interconnected with the municipality's Dock Road power station. The kWh sold increased by 23.33 per cent. More than 45 per cent. of the output was used for traction, which showed an increase of 0.84 per cent. In the rural area the advance was 5.94 per cent. to 14.7 million kWh, compared with 280,000 in 1926.

The whole output of the Durban undertaking is taken by the municipality. Witbank is used mainly as a base load station for working in conjunction with the four stations of the Victoria Falls Co. It gives two bulk, thirty-two industrial and mining, and 413 domestic and lighting supplies.

Growth of Domestic Consumption

The whole output of the Sabie undertaking is transmitted at 22 kV to two mining companies. With the extension of its activities in the supply of electricity to domestic users, the Commission has established hire-purchase schemes with encouraging results. A steady increase in the use of electricity for domestic and lighting purposes is reported, sales to this class of consumer having increased from 400,000 in 1928 to 1,643,000 in 1932. The Commission acts in an advisory capacity to the Administrators of the Provinces in relation to municipal electricity supply schemes. Of the 235 schemes reported on up to the end of 1932, 103 were new schemes. During 1932 there were five new schemes and fourteen extension schemes.

The total number of local authorities in the Union and South-west Africa is 483, of which 194 have electricity supply schemes established; 118 generate their own electricity, fifty purchase bulk supplies, and twenty-six have handed over supply and distribution to third parties.

The standard prices in force in the Commission's undertakings are :—

Natal Central.—(a) £25 per annum, plus (b) 8s. 4d. per month per kVA, plus (c) 0.3d. per kWh for first million kWh per annum, 0.2d. for the next two million, and 0.15d. for additional kWh.

Witbank.—(a) and (b) as above, (c) 0.045d. per kWh.

Capetown.—(a) 13s. 7d. per month per kWh for first 250 kVA of m.d., 12s. 3d. for next 250 kVA, and 8s. 4d. for additional kVA, plus (b) 0.5d. per kWh for first 100,000 kWh, 0.4d. for next 200,000 kWh, and 0.3d. for additional kWh.

Durban.—(a) £4 4s. per kWh of m.d. per annum, plus (b) 0.175d. per kWh.

Steel-frame Motor Manufacture

The Norwich works of Laurence, Scott and Electromotors, Ltd.

ONE indication of virility in the electrical industry is the way in which old-established manufacturing concerns that have earned high reputations in specialised fields are adapting themselves to meet changing conditions. Among those which have taken their courage in both hands are Messrs. Laurence, Scott & Electromotors, Ltd. This firm celebrates its jubilee this year, having been founded by Mr. W. H. Scott in 1883; he was then twenty-one years of age and is now chairman of the company, still playing an active part in its affairs.

Until 1929 the company was known mainly for its marine electrical work, claiming to have the largest shipping connection in the world; 85 per cent. of its output was absorbed in this way and 40 per cent. of its products were exported. To compensate for the effect of the falling-off in the shipbuilding business, Laurence, Scott entered the industrial field with a.c. motors. They decided that as they had been pioneers in the d.c. field so they must strike out on original lines in their new development. And originality, but untainted by any shadow of freakishness, was the main impression we received from a recent visit to the Gothic Works at Norwich. Here a.c. motors of over 50 h.p. and d.c. machines of over 25 h.p. are built (the smaller sizes being produced at Manchester).

The present orientation has entailed considerable expenses for research, experiment and other development charges, but Capt. J. G. Scott informed us that these costs have been written off at the end of every year in which they have been incurred.

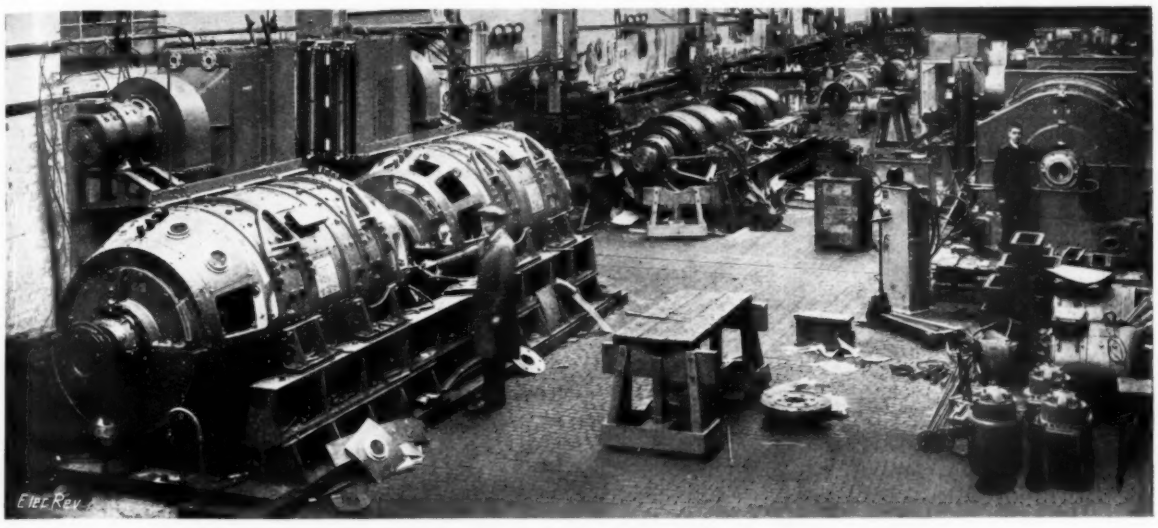
Extensive Use of Welding

Perhaps what most strikes the eye of the visitor to the works is the large number of welders at work. The machines employed are the Burke-Scott arc welders which deliver a slightly increasing current with a shortening of the arc and *vice versa*; bare electrodes are used throughout.

It is possible, seemingly, to exaggerate the influence of machine tool progress in engineering works practice. The construction of steel-frame motors by the Scott-Mossay process (Mr. A. P. Mossay is technical director and the inventor of the "Emeol" motor among many other things) calls for very little machining, and that at the end of the manufacturing process; we noted that the machining of an 80-h.p. motor, apart from the shaft, occupied only about twenty minutes. The reason for the slight dependence on machine tools is that fabrication (in which the firm claims to have been among the first to operate on any appreciable scale in this country) has apparently been applied to every operation that lends itself to the method.

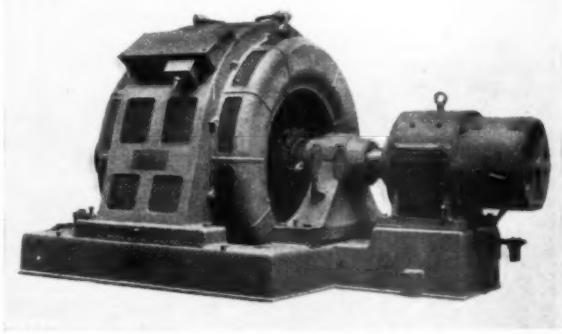
The stator stampings of the steel-frame motors are built up and welded as a unit under pressure and are then welded on the outside to the main steel ribs (eddy currents due to this are found to be negligible); outside these bars are heavy steel circular bands, which in turn are welded to the bars, so that the whole stator is a homogeneous unit. Machines are being made on the S.-M. system in two other countries under licence from Laurence, Scott. As the feet are welded afterwards to the frame these can be made in any size to suit shaft heights and bolt centres—a most convenient method for dealing with replacements for change of frequency or alteration of system from d.c. to a.c. Both stator and rotor are held by four or more keys welded in place, and the system of construction should permit of the maintenance of an even air gap and hence good power factor. Slot insulation consists of a minimum of 15 mils. of mica reinforced with 20 mils. of other (impregnated) insulation.

Among other products of the firm which we saw going through the shops, those of particular interest at the present time included one of the heavy-duty 95-h.p. motors for the Armstrong-Whitworth shunting locomotives, six of which have been built. The company has a good Diesel-electric connection, having built the motors for Harland & Wolff locomotives and has equipped several Diesel-electric coaches. There were also to be seen the carcases of motors for submarine propulsion ordered by the Admiralty (with other electrical equipment) as part of this year's programme of naval construction.



A bay of the Laurence, Scott & Electromotors works showing machines on test.

A 785-h.p., 750-r.p.m., 3.3-kV synchronous motor-generator set is awaiting installation at the Old Mill (a conversion job) of Messrs. Wiggins, Teape & Co., Ltd. The contract also includes three Ward-Leonard combinations and nineteen motors with an aggregate capacity of 1,830 h.p.; this is in addition to the 130 motors now running in the new paper mill. One must also mention the Heyland exciters (Dr. Alexander Heyland is consultant to the company), six of which are being supplied to Dunlop Rubber Co. for power factor correction. We saw one of the little "Capacitor" motors (¼ h.p.) running; we were struck with its almost silent working and good starting properties, and neatness of the self-healing condenser incorporated. Flame-proof and roller motors (with Buxton certificate) appear to be in demand judging from the number under construction.



A 525-h.p., 6,600-V, 250 r.p.m. auto-synchronous motor

A tour of the control section indicated much of interest also. Prominent were the searchlights for the Admiralty, controllers for the shunting locomotives, a turbine rotor-balancing machine, traffic signals and contactors, of from 5 to 2,000-A capacity. Laurence, Scott & Electromotors, Ltd., have several important developments pending.

The Shipping and Engineering Exhibition

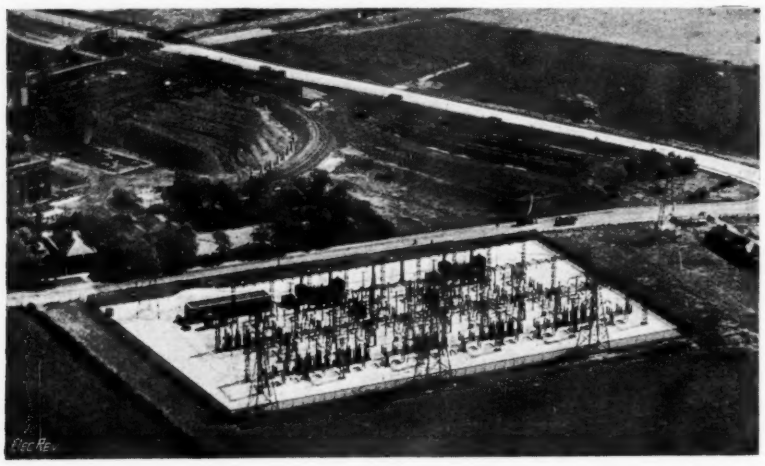
Exhibitors of electrical and allied apparatus

THE biennial Shipping, Engineering and Machinery Exhibition opens on Thursday, September 7th, at Olympia and will continue until Saturday, September 23rd. The honorary president this year is Lord Stonehaven (president, Institute of Naval Architects) and the general manager, as before, is Mr. F. W. Bridges; active support comes from the British Engineers' Association (Inc.), the Society of Motor Manufacturers and Traders, Ltd., and the British Marine Oil Engine Manufacturers' Association. The exhibition offices are at Grand Buildings, Trafalgar Square, London, W.C.2. Official visits on specified days will be paid by the leading engineering and allied institutions. The official bulletin includes 230 names, particulars of whose products are given in English, Italian and French.

A newcomer is the Department of Scientific and Industrial Research, which is responsible for a stand on which will be displayed exhibits illustrating research work carried out by the Department or in the laboratories of associations formed under its auspices.

The following firms will show plant and apparatus relating directly or indirectly to the production and utilisation of electricity :—

Ailsa Craig, Ltd., oil-electric generating sets; J. J. Allen & Co., steam traps; W. H. Allen, Sons & Co., Ltd., oil-electric generating sets, steam-turbo-generators (a.c. and d.c.), motors and control gear, fans, and pumps; Alfa-Laval Co., centrifugal oil purifiers; Geo. Angus & Co., Ltd., conveyor belting and packings; Sir W. G. Armstrong, Whitworth & Co. (Engineers), Ltd., Diesel-electric traction units, Spencer-Hopwood w.t.



An aerial view of the transforming station at Barton, Manchester [*Aerofilms.*

boiler, "Isothermos" axle-box units; Atalanta, Ltd.; Atlantic Engine Co. (1920), Ltd., Diesel engines; Auto-Klean Strainers, Ltd., new reverse-flow oil strainers; Automatic Coil Winder & Electrical Equipment Co., Ltd., coil-winding machines and measuring instruments; Automotive Products Co., Ltd., paraffin engines for arc welders, clutches, oil filters, and heavy-oil engines.

Babcock & Wilcox, Ltd., sections of marine-type boilers, with Bailey furnace and Erith-Roe retort-type stokers or oil burners, Bailey p.f. furnace, and fusion welding process; Batteries, Ltd., "Nife" nickel-cadmium alkaline accumulators; Beldam Asbestos Co., Ltd., packings; Beldam Packing & Rubber Co., Ltd., high-pressure packing (asbestos and white metal); Bellis & Morcom, Ltd., airless-injection dry-sump oil engine, steam-turbine and high-speed steam engines; Edward Bennis & Co., Ltd., three-flued stokers with controllable secondary air and variable-speed motors; B. E. N. Patents, Ltd., petrol generating sets, electric tools and equipments; Bergius Co., Ltd., "Kelvin" petrol, paraffin, and heavy oil engines; Birmingham Battery and Metal Co., Ltd., condenser tubes; Birmingham Electric Furnaces, Ltd., forced-air circulation furnace for low-temperature heat treatment; Black & Decker, Ltd., portable electric tools; Blackstone & Co., Ltd., spring-injection oil engine sets; Bosch, Ltd., electric tools; British Dardelet Threadlock, Ltd., bolts, nuts, set-screws and taps; British Oxygen Co., Ltd., electrodes for arc welding; S. G. Brown, Ltd., electric compasses and indicators.

Cable Makers' Association, all types of insulated cables; Cape Asbestos Co., Ltd., heat-insulation for boilers; C.A.V.-Bosch, Ltd., compensated-voltage control dynamos, nickel-iron batteries; Chance Bros. & Co., Ltd., heat insulation; Clews, Petersen Piston Ring & Engineering Co., Ltd., piston and scraper rings; Crossley Bros., Ltd., Diesel engines.

Davey Paxman & Co., Ltd., Diesel Engines; Dewrance, Ltd., boiler mountings and fittings, "Bi-colour" water-level indicators; Drew, Clark & Co., "Diamond" telescopic tower ladders for overhead equipment maintenance; Donlarm, Ltd., fire detector.

Electric Resistance Furnace Co., Ltd., furnaces for low temperature alloys; Electro-Mechanical Brake Co., Ltd., compression-ignition engine; Elliott Brothers (London), Ltd., measuring and testing instruments, current transformers, boiler-control apparatus; Engineering Products, Ltd., motor starters, small circuit breakers, time switches; Equipment & Engineering Co., Ltd., electro-magnetic crack detector.

Ferguson & Timpson, Ltd., oil purifiers, valves; Fescol, Ltd., electro-chemical deposition; Flextol Engineering Co., Ltd., power-driven hand tools; Foster Instrument Co., various temperature measuring instruments, &c.; John Fowler & Co. (Leeds), Ltd., Diesel engine; Fletcher & Miller, Ltd., cutting oils and lubricants.

Gleniffer Engines, Ltd., Diesel engines; Alfred Graham & Co., Ltd., telephone instruments; Germ Lubricants, Ltd.; F. Gilman (B.S.T.), Ltd., boiler scaling machines; Grant & West, Ltd., packing; E. Green & Sons, Ltd., fuel economisers; Hydraulic Coupling & Engineering Co., Ltd., fluid couplings; J. & E. Hall, Ltd., air compressors; Hall & Hall, packing rings; Henry Hughes & Sons, Ltd., magneto striction echo sounder; Imperial & International Communications, Ltd., wireless telegraphy apparatus; International Marine Radio Co., Ltd., wireless telegraphy and telephony apparatus; Kelvin, Bottomley & Baird, Ltd., gauges, medical appliances and telephones; K.F.M. Engineering Co., Ltd., electric signs; George Kent, Ltd., boiler control apparatus; Richard Klinger, Ltd., gauges and packing.

H. Lauritzen, colloidal treatment for scale formation; Lea Recorder Co., Ltd., distance recorders, coal-meters; London Electric Firm, projectors; Loranco, Ltd., magnetic chucks and electric etching pencils; Marconi International Marine Communication Co., Ltd., wireless telegraphy and telephony; Marconi Sounding Device Co., Ltd., echometer for 4-V operation; Mawdsley's, Ltd., welders and motors; W. & H. McLaren, Ltd., heavy-oil engines; Marine Electrical Equipment Co., Ltd.; T. & F. Mercer, electric clocks; Mirrlees, Bickerton & Day, Ltd., Diesel engines; Mosers, Ltd., ball bearings and lubricators; Morris Motors, Ltd., industrial oil engines; Murex Welding Processes, Ltd., arc welding and electrodes.

National Gas & Oil Engine Co., Ltd., four-stroke oil engines; Negretti & Zambra, electrical thermometers; Newtons of Taunton, Ltd., electric tools, rectifiers, motors, and generating sets; N. L. Reflectors, Ltd., "artificial daylight" fittings; Non-Ferrous Die Casting Co., Ltd., gravity-process casting; Norris Henty & Cardners, Ltd., oil-engine generating sets.

Ozonair, Ltd., ozone production apparatus and air filters; C. A. Parsons & Co., Ltd., model of 30,000-kW turbo-alternator, water-gauge periscope, rural-type transformer; Petters, Ltd., heavy-oil engines; Philips Metalix (Philips Lamps, Ltd.), X-ray equipment for examination of castings and welds, welding rectifier; Power Contracts (Batwin), Ltd., repulsion-induction and d.c. motors.

Rawlplug Co., Ltd., electrical percussion hammers; Reavell & Co., Ltd., air compressors and exhausters; Renold & Coventry Chain Co., Ltd., machinery drives; Ross, Courtney & Co., Ltd., terminals and cable sockets; Arthur Ross, Hotchkiss & Co., Ltd., boiler circulators; Ruston & Hornsby, Ltd., 110-kW airless-injection oil engine and generator; Ruston Lister Marine Co., Ltd., Diesel engines and generator.

Siemens Electric Lamps & Supplies, Ltd., "Zed" fuse distribution boxes, floodlights, immersion and tube heaters; Siemens Bros. & Co., Ltd., telegraph and telephone systems, wireless equipment; Selson Machine Tool Co., Ltd., "Losenhausen" balancing and testing machines; Siebe, Gorman & Co., Ltd., safety lamps; J. G. Smithson & Co., Ltd., contactors for a.c. and d.c. motors, direct-on starters; Sperry Gyroscope Co., Ltd., searchlights; J. Stone & Co., Ltd., oil-purification; Streamline Filter Co., lubricating oil filters; Synchronome, Ltd., electric clocks; Super-Centrifugal Engineers, Ltd., oil purification equipment.

R. C. Taylor & Co., metallic packings; Tecalemit, Ltd., lubricators; Telephone Manufacturing Co., Ltd., loud-speaking telephones and clocks; Thomas & Bishop, Ltd., packings; John I. Thornycroft & Co., Ltd., compression-ignition oil engines; Turbine Furnace Co., Ltd., steam-jet draught furnace; United States Metallic Packing Co., Ltd.; United Water Softeners, Ltd., electrically controlled mixing of reagents; Universal Metallic Packing Co., Ltd.

Varley Pumps & Engineering, Ltd., electric pumps; C. E. Vokes, Ltd., oil and dust filtrator; C. C. Wakefield, Ltd., lubricators; James Walker & Co., Ltd., packing; J. Samuel White & Co., Ltd., oil engines; Wellworthy, Ltd., piston and scraper rings; Henry Wiggin & Co., Ltd.; Wild-Barfield Electric Furnaces, Ltd., and G. W. B. Electric Furnaces, Ltd., heat-treatment furnaces; Yorkshire Copper Works, Ltd., condenser tubes.

Italian Electrical Conference

The thirty-eighth annual conference of the Associazione Elettrotechnica Italiana is to be held in Sorrento from September 17th to 23rd. Among the subjects on which papers are to be read are: "The Electronic Theory of Metals," by Sig. Gleb. Wataghin; "Bimetallic Conductors," by Sig. F. Motti; "Magneto-physics," by Prof. A. Sellerio; "Insulating Oils," by Dr. Da Fane; "The Insulation of H.P. Traction Motors," by Sig. F. Bianchi, and "Special Materials for Illumination Technics," by Sig. C. Clerici.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

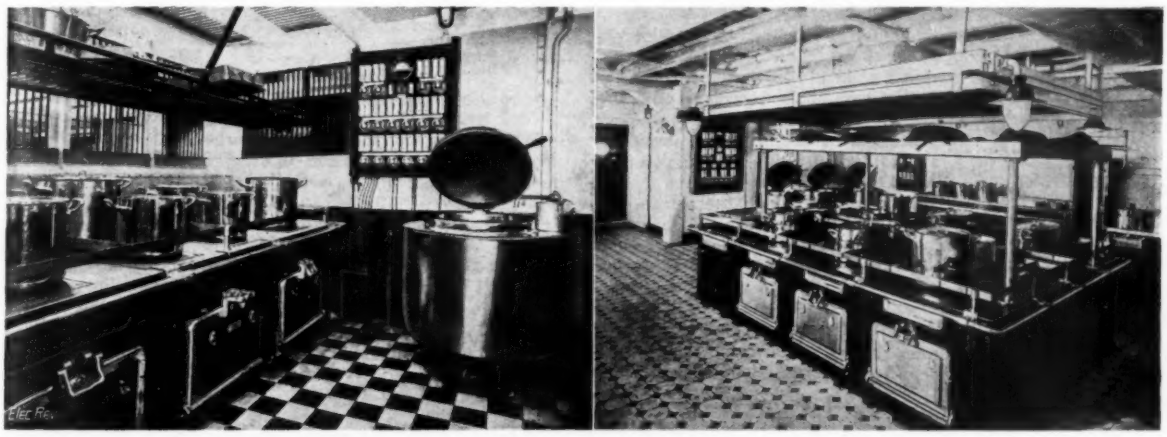
Holidays and Hotels

The leaderette, in your issue of August 18th, regarding holidays and hotels, prompts me to record the following: I stayed recently in a good class hotel at a seaside town of about 4,000 standing population and little more than 100 miles from London. I soon saw that the management was most assiduous in providing for the complete comfort of the visitors. Yet in none of the reception rooms was the lighting adequate for comfortable reading. In my bedroom, and I presume in all the others likewise, a 25-W lamp was provided. 15-W lamps were standard in the bathrooms, and in one lavatory I noticed a 5-W "Osglim" lamp.

This is perfectly disgraceful. As an electrical engineer connected with the contracting trade I suppose I should have "rubbed it in" as you suggest and be willing to supply you with the name of the offender for your black list. Yet I really could not bring myself to do so. I hold no brief for people who take on themselves the running of hotels, and I know it is their business to provide for the comfort of their guests, but a polite little notice pinned underneath each switch forbade a display of even righteous anger. It ran "Electric light is one shilling a unit. Please switch off when not required." Yes—at a "hotel at a seaside resort in this summer of 1933!"

Should the manageress, rebuked by your electrical man, hold the modern business principle that "the customer is always right" and contemplate the cost of current in silence? Get after the hotel keepers by all means but get after the electrical engineers, too, and when you talk to them ask them why the current at one shilling per unit cannot be produced in such a manner that it will not give rise to a continual lamp flicker and grow faint just as one arrives at the most thrilling episode of that murder mystery. Then, perhaps, we can have plugs to enable us to unravel the thrilling mystery in complete comfort—in bed, and more money with which to go to the seaside, and "rub it in" when necessary.

August 24th. INSTALLATION WORK WANTED.



Two views of the "Vesta" electric cooking equipment installed in the s.s. *Baloeran.* **(See page 298)**

The Summer All-electric House

The attempts at designing all-electric houses so far undertaken have, unfortunately, not been rewarded with any appreciable measure of success, chiefly due to the reluctance of the average householder to depart in one step from the older and more conventional ideas of room and water heating, cooking, &c. The experience gained indicates that the total electrification of the home must be effected gradually; the general public will gather further confidence in the increased domestic usage of electricity, concurrently with each new stage of development introduced.

The recipient of an electricity supply obtains an appreciable amount more than the number of units purchased—the service and convenience associated with the usage of electricity. To a minor degree this is also applicable to other public utilities, and the undue stressing of the service factor is inadvisable while demand is chiefly governed by competitive cost. As the demand for electric bell systems, all-electric radio sets, and clocks will be stimulated by the standardisation of frequency, better provision should be made for the utilisation of these small-current consuming but invaluable appliances.

The adaptation of electrical appliances and methods of installation to suit existing building conditions must be considered as a temporary measure, as the design of a house should be materially influenced by the methods of room and water heating, ventilation, &c., employed. Electricity cannot be expected to be utilised to the maximum advantage and efficiency in the future unless favourable building conditions are forthcoming. The satisfactory replacement of the ordinary coal fire presents a difficult problem, as it is still recognised as one of the main attractions in ordinary living-rooms, irrespective of its value as a heating agent. This innate attraction may disappear gradually if compensations are introduced, *e.g.*, decorative lighting, wireless installations, and the general redesigning of rooms.

The present stage of development is mid-way on the road towards total domestic electrification and certainly justifies the running of "summer all-electric houses." Consumers may welcome such an idea, for besides effecting economy in coal during the summer months, the benefits of all-electric working are realised at a time when they are most appreciated. Cooking, water heating, and, perhaps, very occasional room heat are alone necessary, and provided supply authorities offer concessions regarding the hiring of appliances, and charges for electricity during the summer months there appears no reason why the summer all-electric house should not be a successful forerunner of complete electrification.

From a supply authority's point of view, the value of such a scheme as a means of equalising winter and summer loads is incalculable. The total electrification of a house for approximately six months per annum also would undoubtedly be more remunerative than the partial use of a cooker all the year round.

The installation of electric hot-water systems in new houses cannot be too strongly advocated, as well as the electrification of the ordinary hot-water systems, special attention being paid to correct lagging and thermostatic control.

There are indications that slum clearance is to receive serious attention in the near future, and this might afford supply authorities considerable opportunity for domestic development. The present average housing scheme provides an illustration of the deterrent effects of non-co-operation between supply undertakers and building authorities. The average scheme is usually spread-eagled over a large area, and methods of room and water heating employed are of the past generation. The controversy regarding the utilisation of gas or electricity introduces further complications. It is essential that there should be closer working between the supply undertakings and the building authorities if progress is to be made.

Spennymoor, *August 22nd.* F. D. PARKER.

"Over the Top"

We all occasionally grow enthusiastic in a similar manner to your correspondent "The Major" over the progress of electrical development.

He talks very "staffishly" of the "provision of long range guns and increased funds for ammunition," &c., about the "development army corps" and "plans of attack," and he uses other expressions which show an elementary knowledge of warfare, but he makes a terrible hash of it when he sends untrained infantry into the front line and when he ignores altogether that most dangerous of all warfare, "gas attacks" and the methods of counteracting them.

It is the old trouble experienced so often during the war—telling us what to do without telling us how to do it.

August 25th. P. B. I.

Round or Flat Pins?

With regard to Mr. Dean's letter in your issue of August 25th I quite agree that his experience is certainly possible in respect of plugs not made to the February amendment. It would be interesting to know whether these plugs are manufactured in accordance with the latest wording of the Specification. I would regard Mr. Dean's experience as pointing all the more to the desirability of universal interchangeability instead of considering that "such interchangeability has lost its case." Surely the "case" is still as commendable as ever; it is only the efforts that have hitherto been unsuccessful.

Referring now to Mr. Willis's letter I may state that my previous remarks regarding prices were not made with reference to the general construction of the flat pin type plug and socket, but referred solely to the relative costs of the pins and contacts themselves. Mr. Willis and Mr. Scholes both suggest that I have ignored the subject of interchangeability. Quite so, for three reasons:—(1) The heading of the correspondence is "Round or Flat Pins?" not "Interchangeability." (2) Neither Mr. Willis nor Mr. Scholes will surely dispute the obvious fact that interchangeability is highly desirable provided the performance of the article is all that it should be. (3) There is no reason on earth why interchangeability with round pins should not be obtainable, especially with the February amendment.

I should like to emphasise again that the above-mentioned amendment calls for: (a) Ordinary manufacturing tolerances on pin diameter and (b) resilience of the socket portion to grip pins made as above. If there is anything in the *wording* of the Specification as distinct from the *meaning* which allows a loophole for errors which jeopardise such possible interchangeability, let us rectify it instead of reverting to the confusion of ten or fifteen years ago.

On the subject of "springiness" it is surely realised that this springiness cannot be eliminated in the combination of a satisfactory plug and socket, a fact which even Mr. Scholes has admitted in reference to his flat bar. Good contact must depend on resilience, no matter whether round or flat pins are used. Granted then that a certain springiness must be incorporated I contend that universal interchangeability of plugs and sockets correctly made to the present amended Specification is not only possible but inevitable, and it is up to all manufacturers to take the wider view and hasten this state of affairs. J. B. TUCKER, *Managing Director.*

J. H. Tucker & Co., Ltd.

Tyseley, Birmingham, *August 25th.*

"What Shall I Have to Pay?"

In response to your invitation to your readers who may have had experience in running an all-electric house, I am submitting the accompanying details in the hope that they will be of interest to others. In this house no coal is used at all, and gas for two boiling rings *only* is used, as gas at 7.2d. per therm is more satisfactory in every way than the enclosed electric boiling plates. The apparatus connected is as follows:—Living room: one 3-kW radiator permanently fitted in; sitting room, bedrooms, &c.: one 2½-kW radiator (portable); a 1-kW immersion heater in a 15-gallon cistern; a 350-W flat iron; a vacuum cleaner; a 150-W "Tungar" rectifier, and a 6-kW Jackson cooker. Total load=12.8 kW.

For the year 1932 the consumption worked out as follows:—

	kWh	Charge
March, 1932	2,160	£5 2 9
June, 1932	809	2 6 6
Sept., 1932	473	1 12 5
Dec., 1932	1,494	3 15 0
Total ...	4,936	£12 16 8

The tariff is 15 per cent. of the rateable value plus ¼d. per kWh. In my case the standing charge is 12s. 9d. per quarter, and this, added to the unit charge, brings the cost to approximately 0.6d. per kWh over the year.

I may say that the substitution of the 3-kW radiator for a gas fire and the use of an immersion heater for hot water instead of employing gas has effected a saving of about £4 per year, a further saving having recently been made by substituting a 300-W heater for the 1,000-W one. Space forbids me to go into further details at present, but in the event of any of your readers wishing for further details I will be pleased to supply them. H. WILLOUGHBY.

Nottingham, *August 23rd.*

Electricity in Mines

THE report of the Electrical Inspector of Mines, Mr. J. A. B. Horsley, for 1932 (Stationery Office, 1s.), shows that the number of mines at work was 2,158, compared with 2,243 in the previous year. Of these 1,359 used electricity with 885,131 h.p. of motors installed above ground and 970,131 h.p. below. The total of 1,855,262 h.p. (336,000 d.c. and 1,519,000 a.c.), compares with 1,833,536 h.p. in 1931, the number of motors having increased by 1,096 to 41,758.

There were five accidents attributable to electricity which caused fatalities; four lives were lost by shock and twenty-seven in the explosion at Garswood Hall due to sparking on a signal-bell circuit; but for the latter the record for 1932 would have been the most favourable for many years. There were also sixty non-fatal electrical accidents (involving sixty-three people), bringing the total to sixty-five with 1.86 million h.p. installed, as against fourteen fatal and seventy non-fatal with 1.36 million h.p. in 1923. Two fatal and twenty-four non-fatal accidents were associated with the use of trailing cables and plugs with 3,970 electrical coal cutters compared with one fatal and eighteen non-fatal in 1923, with 2,745 electrical coal cutters.

The apparatus involved in the accidents was: switchgear and fuses, 29; flexible or trailing cables and plugs, 26; armoured cables, 4; overhead lines and unarmoured cables, 2; cable junction box, 1; dynamos and motors, 2.

Electrical coal-cutting machines decreased by fifty-six to 3,970, and compressed air machines by 178 to 3,167. Machine-got mineral now amounts to 37.7 per cent. (34.2 per cent. in 1931). The number of electrically driven conveyors and loaders increased by 184 to 2,483 and compressed air machines by three only to 2,160. The percentage of coal conveyed to mineral got was 24.7 (21 in 1931).

The more common defects reported relate to imperfect repair of trailing cables, switch interlocks, omissions to test earthing continuity, plug and socket couplings in disrepair, inadequate quantity of oil in switchgear, excessive setting or inadequate automatic protection, cable armour insecurely attached to apparatus and cable unsealed, no suitable means to discharge cables and the use of uncertified signalling bells. It is not unusual to find that the means provided, if any, to protect the lower- from the higher-voltage system of small lighting transformers is unknown to those in charge, but the standard of maintenance and the quality of the equipment is steadily rising.

During the year the work carried out at the Testing Station at Harpur Hill, Buxton, included the acceptance of 149 pieces of apparatus for test and the consideration of fifty-nine others; fifty-one were withdrawn. Apparatus certified (details of which are given in an appendix) included thirty-five motors, twenty-two switches, eight coal-cutters and drills, two transformers, six plug and socket couplers, one lamp fitting, and five instruments and relays. There is a growing tendency to require plant certified by the Department. In the design of flame-proof apparatus cast iron is being increasingly displaced by fabricated structures. Buyers of flameproof apparatus are recommended to ascertain whether the design has been certified by a recognised authority. This applies especially to oil-immersed switchgear in which the test procedure has been changed. Tests should be made by an independent authority as recommended in British Standard Specifications for flame-proof switchgear and motors.

Flexible cables are the most vulnerable part of the electrical equipment at the coal face. A summary of the paper which was presented by Mr. Ll. B. Atkinson, on behalf of the Cable Makers' Association, before the Association of Mining Electrical Engineers is included. There is evidence that this has resulted in a definite improvement in the standard of repairs. An appendix contains a diagram to suggest the more extensive use of pliable armoured cable to replace unarmoured flexible cable. The lay-out provides for the ready disconnection of the cable serving a conveyor or loader by a plug, at one end, where the plug is dead when out of the socket; at the other end is a bolted coupling that would be detached only by an electrician. A large proportion of accidents with trailing cables could be avoided by the use of cables with an earthed metallic screen surrounding the live conductors, and associated with leakage trips on the circuit breaker. A B.S.S. for trailing cables is needed.

Attention is drawn to General Regulation No. 131 (a), which prescribes that "no person except an electrician or competent person acting under his supervision shall undertake any work where technical knowledge or experience is required in order to avoid danger." It is emphasised that the supervision must be actual and must be exercised on the spot, so long as the potential danger exists. A professionally-trained engineer competent to organise and control such work is required, instead of leaving all details to be extemporised by workmen whose safety is at stake.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Metal Rectifiers

A Westinghouse "H.T.13" metal rectifier unit

The WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD., 82, York Road, King's Cross, N.1, has recently added to its range of h.t. units, two new models—"H.T. 12" and "H.T. 13."

The former is designed specially for loud speaker work, has a smoothed output of 200 V and 30 mA with an a.c. input of 140 V and 120 mA, and costs 17s. 6d.

At the same price model "H.T. 13," specially recommended for q.p.p. and "Class B" eliminators, has a smoothed output of 150 V and 25 mA (nominal), and an a.c. input of 150 V and 40 mA.

A New Garage Floodlight

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has produced a floodlight arranged for mounting on a strap bracket which can take the form of a post top or pole clamp mounting for floodlighting ground areas and the façades of garages, petrol service stations, &c.

The new "G.E.C." floodlight

This new unit, which is designed to accommodate a 200-W lamp, is somewhat similar to the G.E.C. dog track reflector, but is turned on its side with an opal glass top reflector to give a diffused light on to the ground and fluted and diffusing mirror glasses to provide a strong illumination over a wide area on to the building face. This floodlight has been designed for installation with the lamp in a vertical position, cap upward, and should not be used for upward flooding as it has no front glass and the lamp and lampholder are unprotected. The price is £2 7s. 6d.

New Push-button Box

A new type of oil-proof push-button box, with a retractive push-button switch for either normally open or closed operation, has been produced by MODERN POWER CONTROL, LTD., 102, Shoe Lane, London, E.C.4, principally for use on rotary printing press operation and paper-mill work.

The new push-button box

The switch consists of a base on which is screwed the barrel or body, which has moulded into it two semi-circular brass contacts with suitable terminal screws and washers. The moving plunger carries two semi-circular brass contacts operating against spring tension with the fixed contacts in the barrel. A cap screws down into the top of the barrel and holds the plunger in position, so that the interior of the switch is totally enclosed. Rubbing contacts ensure that the whole is self-cleaning and dust-proof. By reversing the barrel the switch can be made normally open or normally closed.

The cover embraces the whole depth of the circular, machined cast-iron box. Separate shrouded plungers in the top of the box engage with the switch plungers inside. Cable entry is through a machined mild-steel block, threaded and tapped, and it can be used for either conduit or cable glands, and if required for looping with the latter a special four-way piece can be fitted. Box fixing is by three external cast lugs threaded to take a $\frac{3}{16}$ in. or $\frac{1}{4}$ in. screw.

For the stop circuit there is an extra large millhead plunger, and for the lock or safe switch a similar plunger is provided, except that it has a slot across the centre and is arranged with a groove in the boss, so that a push and half-turn mechanically locks the switch out of circuit.

Only one type of switch is required for all three operations normally open, normally closed and safe, and 1-, 2-, 3-, 4- and 5-way boxes, with or without signal devices, are available.

A New Hydrometer

A new hydrometer made by MESSRS. FREDERICK J. GORDON & CO., LTD., 92, Charlotte Street, London, W.1, is known as the "Gordometer" and priced at 7s. 6d. The design of the bulb gives great resiliency and makes for easy and quick filling, and the special shape prevents the hydrometer rolling off the bench, but should it fall the rubber parts are so designed that they protect the barrel and prevent breakage.

The barrel is of large diameter, giving ample clearance for the float, which is accurately graduated with a coloured scale

The "Gordometer"

for easy reading. All the rubber parts are of high quality, and the instrument is British made.

New "R.I." Receivers

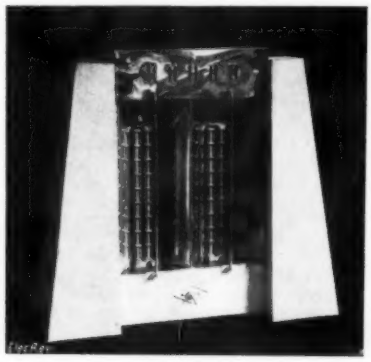
Among the new season's radio sets introduced by RADIO INSTRUMENTS, LTD., Purley Way, Croydon, are the "Madrigal" 3-valve all-mains and 4-valve "Class B" battery sets employing "Micron" iron-dust cored coils. These receivers are among the first of this type to be manufactured on a commercial scale employing this device, and are both priced at 15 guineas. A moving-coil loud speaker is contained in both models, and operation is simple by means of a four-way switch with long wave, medium wave, gramophone and "off" positions.

A Thermal Flasher

We have received from the ABBEY ELECTRICAL CO., LTD., 343, Abbey House, 2, Victoria Street, London, S.W.1, particulars of a new b.c. British-made thermal flasher priced at 5s. There are two types, both with a maximum load of 60 W a.c. or 100 W d.c. Panel mounting flashers are priced at from 40/100 W a.c., 6s., to 200 W a.c., 8s.; and from 60 W d.c., 6s., to 120 W d.c., 8s.

New Reflector Fire

Included in their winter season's fire catalogue is the "Cleopatra" fire, a new product of MESSRS. H. W. SULLIVAN, LTD., Leo Street, Peckham, S.E.15. This is of very striking design with clear-cut lines.



The "Cleopatra" fire

The two "Uniglow" 1-kW elements are vertical and are sunk into polished aluminium reflectors, the single foot-operated switch being situated below them in the centre. The dimensions of the new "Cleopatra" fire are 16½ in. high by 20½ in. wide by 6 in. deep, the weight is 10½ lb., and the price £2 19s. 6d.

Coloured Floodlighting Developments

Considerable reductions in the cost of coloured floodlighting are claimed to be made possible by an invention which has just been placed on the market, the British manufacturing rights of which have been secured by the PATTERN MAKERS (ENGINEERING) CO., LTD., Shrewsbury Road, London, N.W.10, from Liquid Signs, Ltd. It introduces an entirely new system of obtaining colour changes and can be adapted to any existing lighting arrangements.

The invention consists of a device whereby coloured liquids are made to rise and fall between glass screens fixed to the front of the projector. These screens are double and are formed by three sheets of glass sealed up with a slight space separating each sheet.

A pump operated by electricity keeps the liquid in motion, and with plain glass it is possible to obtain three shades of light in addition to white. If, for instance, red liquid is used in the front screen and blue in the other, while one screen is filled with red liquid, red results. Then as the red subsides, the blue liquid rises giving that coloured light. With both

screens filled, red and blue intermingling produce a purple shade.

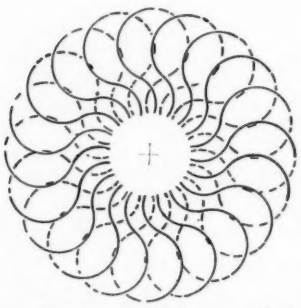
There is no necessity for dimmer, flasher or change-over switching, the only mechanism—the pump—being automatically operated. Where a group of lights is employed the one pump and liquid container control the group.

In addition to the floodlighting screens smaller sizes working on the same principle can be made for fixing to cinema projectors, while the adaptation of the invention to interior lighting of restaurants and cinemas is now being considered.

Owing to the fact that light when projected through liquid is found to be clearer than if projected through a colouring substance, less powerful lamps are needed.

A Revolving Neon Sign

THE MEK-ELEK ENGINEERING, LTD., 57, Victoria Street, S.W.1, has put on the market a new type of sign, the neon tubes of which rotate at such a speed that their glass cannot be clearly distinguished. A continuous light would result in a continuous sheet of colour, but since neon tubes fed with a.c. light up and extinguish every half-cycle, and since the tubes are in various positions when the current impulses are fed to them, each tube is visible in these positions only. A symmetrical pattern is thus produced which may be of one colour or of mixed colours, depending on the gases with which the tubes are filled, and it appears as if a great number of interwoven tubes are employed.

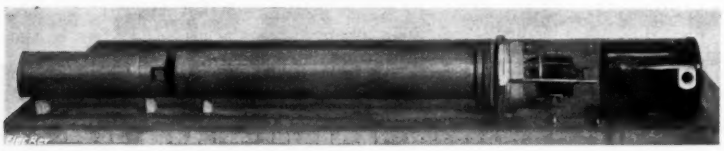


A diagram showing the effect produced by the revolving neon sign

Behind the rotating tubes a stencil may be mounted, being illuminated by filament lamps from behind, and these are switched together with the transformers feeding the tubes so that the neon pattern and wording on the stencil appear alternately. Due to their speed of rotation, the tubes do not obscure the stencil at all while they are revolving.

The neon tubes can be separated into two groups which may be operated singly or combined, thus automatically giving a series of three patterns as the machine operates. The pattern can also be changed in a few minutes by the use of interchangeable tube carriers.

In order to avoid accidental contact with the rotating tubes and also the possibility of pieces of the glass tubes being flung out by centrifugal force, the signs are housed in metal cases fitted with fronts of "safety glass."

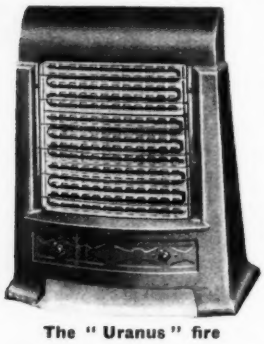


A "Thermolator" with a tube extension piece

Two sizes are available, giving patterns 24 in. diam. and 12 in. diam. The depth of the containing cases from back to front is 15 in. and 10 in. for the two sizes. The whole of the apparatus, including the driving motor, transformers and switching apparatus, is contained in the metal case.

Non-reflector Fires

Two new fires produced by the CARRON COMPANY, Carron, Falkirk, are the "Uranus" and the "Saturn."



The "Uranus" fire

The former is designed on modern lines and is particularly attractive in porcelain enamel finish. It is built of fine grain cast iron, but it is light and has a cool handle. The 3-kW model measures 16½ in. by 6½ in. by 17⅞ in., and in eggshell black enamel costs 40s. 6d.

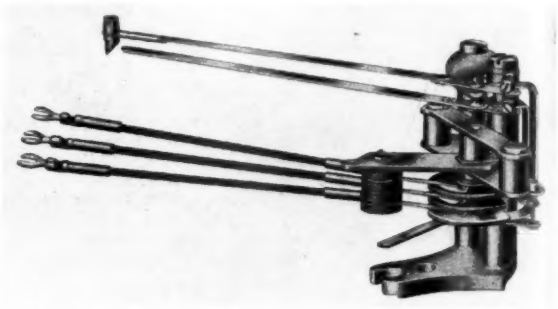
The "Saturn" is a neat one-bar 1-kW model measuring 6¼ in. high, 4¼ in. deep, and 12¼ in wide. It is of novel construction, with an inclined front element, and is very robust. With vitreous enamel finish it costs 14s.

Tubular heaters are now produced by this company in lengths from 2 to 20 ft. at 12s. for the first 2 ft. and 3s. for each additional foot.

An Electrically Operated Instrument Controller

The new "Rotax" positive-operating electric contact controller introduced by the YOXALL INSTRUMENT CO., 42, Gray's Inn Road, London, W.C.1, can be applied to standard "Foxboro" instruments for controlling pressure, temperature, humidity, and liquid level.

The commutator contact assembly, complete with contact brushes, is pivoted on the same axis of rotation as the pointer or pen arm, and the brush arm is connected to the index



The "Rotax" electrically operated instrument controller

arm. When the outside setting arrangement is operated, the entire brush assembly swings around the common axis of rotation.

The commutator discs are assembled to be rotated as a unit by the measuring system. The lower disc is the common contact, its entire contact surface being heavy rolled silver on gilding bronze, and the centre and top commutator discs are insulating material with metallic segments set flush with the surface. This construction insures a perfectly smooth, free operation of the brush from the "Bakelite" to the metallic surface. The segments are platinum faced over bronze and the bushes are provided with platinum iridium contact surfaces.

The entire contact assembly is subjected to a breakdown test of 1,250 V. Small contact capacity makes possible a much higher degree of accuracy, flexibility, and reliability, as well as providing a lower maintenance cost.

Immersion-heater Equipment

A range of immersion-heater equipment recently introduced by MESSRS. FERRANTI, LTD., Hollinwood, Lancs, includes the "Thermolator," a circulator unit complete with a thermostat; the "Circulator," without automatic control; and immersion heaters with and without thermostats.

A unique feature of both the "Thermolator" and "Circulator" is the provision for extending the outer tubes. Each is made in standard lengths of 16 and 30 in., and extension pieces 6 and 12 in. long are available, so that it is possible to fit a 28-in. tube into a tank where there is headroom of only 16 in.

The elements employed throughout are flexible, enabling any one to be removed from its pocket with a head room of 6 in. Each element is loaded at 500 W, and by altering the accessible connections the loading can be varied. The units are fixed by suitable threaded flanges which may be soldered to copper (or bolted to iron) tanks.

"Thermolators" are available in 1-, 2-, and 3-kW sizes for each length, at prices varying from £4 2s. for a 1-kW, 16-in. unit without an extension, to £6 15s. for a 3-kW heater 30 in. long and with a 12-in. tube extension piece.

"Circulators" are all loaded at 3 kW, a 30-in. model without an extension costing £4 15s. The ordinary immersion heaters with and without thermostats, are all 12 in. long, and are available with 1-, 2-, and 3-kW loadings, a 2-kW unit with a thermostat costing £4.

A Demonstration Meter

For demonstration purposes on single-phase circuits MESSRS. SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38, Upper Thames Street, London, E.C.4, have introduced a new meter known as "Type 14."

This instrument is useful when giving demonstrations of cookers, hotplates or fires, as the indicating finger can be reset to "zero" before each demonstration by means of the knob which projects through the glass window.

Consumers' engineers, complaints departments and meter-testing sections will also find the meter of use. It has a maximum rating of 40 A, and models are available for 100/130 V or 200/250 V, 50 cycles, priced at £2 10s.

The Siemens "Type 14" meter

The Lighting Season Here Again

A review of the new lamp publicity matter

THE holiday season is coming to a close, the evenings are drawing in, and lamp manufacturers and dealers are all looking forward eagerly to the darker months which mean increased business. There will be no excuse for dealers to have dull and uninteresting windows or counters, for all they can possibly want in the way of display materials, showcards, leaflets, &c., are obtainable from the lamp producers either free of charge or at a very low cost. With the attractive publicity matter illustrated and described below lamps should this season practically sell themselves.

The slogan "You can 'bank' on 'Cosmos' lamps" forms the theme for various items of the Metropolitan-Vickers Electrical Co.'s advertising material; a lamp in the form of an aeroplane is seen spiralling out of its carton—literally "banking." This is represented in a large window display outfit, the aeroplane being supported clear of the background, and a set of silver pillars ready wired for lamps forms part of the display. A handy unit for counter use to hold folders also shows the aeroplane. A new showcard in eight colours depicting a lamp springing out of its carton like a Jack-in-the-box" illustrates the slogan "A glow with life!"

Illuminated box signs featuring either the "Banking" or "A glow with life!" slogan are available, as well as sandblasted glass panels arranged for either hanging or standing, provision being made for concealed edge lighting at the top or bottom respectively. As a centre piece for small window displays there is a striking sign of neon tubing in two colours to represent the pearl glass and the yellow brass cap of a lamp. It is supplied complete with a high-voltage transformer in a "Bakelite" case into which the tubing plugs directly, standing about two feet high.

A new brochure, besides giving the prices of a very comprehensive range of lamps, contains a glossary of lamp and illumination terms, useful tables of currents taken by lamps and motors, cable figures, metric conversion factors, and full details of advertising material available. It is provided with a thumb index and is punched for hanging up. The envelope series folder, printed in three colours and enlarged, is brightly illustrated and contains prices of all general purpose, automobile and decoration lamps, and specialities like the "Thriftlite" and altar lamps; this folder is available for overprinting. A further folder gives more particulars of the altar lamps, together with details of suitable "Bakelite" fittings.

The General Electric Co.'s programme, which is set out fully in a specially prepared "broadside," is even more ambitious than last year's.

General lighting service lamps differ very little from last year's. "Osram" architectural striplite lamps and internally colour sprayed lamps of 15 and 40 W for sign and decorative work are two developments worthy of attention. Other new lines include a range of single-capped tubular lamps finished in white opal, or tinted in pink or amber for use in decorative lighting fittings; these are described in a new folder available for overprinting.

Some of the attractive new lamp posters, showcards and cut-outs now available

The well-thought-out posters, showcards, display cut-outs, and literature are of a plain understandable character, and the new "Osram" lamp characters "Os" and "Ram" will soon be familiar to everybody. A coloured poster reminds the public that "the name of the lamp you want is Osram"; replicas of this poster in showcard and cut-out form are also available. Convincing literature overprinted with the dealer's name and address complete the company's comprehensive propaganda materials.

The "Popular Pair Kiddies" of Messrs. Siemens Electric Lamps & Supplies, Ltd., are already well known, and this year's designs which are used in the showcards, window displays, leaflets, and signs are more attractive than ever.

For counter use a standing showcard with a pocket for holding price lists has been prepared, and there is a display piece depicting the "Popular Pair" approaching a house, each carrying a lamp; a lamp plugged into the back of the display illuminates the windows and panelling. A showcard shows the pair actually entering the door.

Leaflets obtainable for overprinting describe the complete range of Siemens lamps, including tubular and automobile types. A limited number of glass tablets is available with embossed red and silver lettering.

Philips Lamps, Ltd., are issuing a striking cut-out and a group, of which the principal feature is a figure of the

"Lamp Thief" (in the guise of the Devil) and the admonition "Drive him out—the cheap lamp thief wastes your current and steals your light."

The "House" window display with its attractive colouring should be very popular; it shows the exterior of a pretty little dwelling and bears the inscription "Philips lamps for every room in the house." A brightly illuminated lamp and the words "Philips measured light lamps 100 per cent. efficient light" form the theme for a showcard, while the well-known slogan "Use Philips lamps and see" appears on a new transparency. There is also available a cardboard strip decorated alternately with lamps and the word "Philips."

Publicity matter for "Philips Duo-Savelite" lamps includes a telling showcard in full colours and well illustrated leaflets. A transparency depicting a motor-car with very powerful headlights focuses attention on the company's automobile lamps, in connection with which an attractive leaflet is also obtainable.

As was the case last year, the Philips publicity campaign will be strongly supported by the Philips photometer.

The well-known "Beauty enriched by light" picture is again given a prominent place in the British Thomson-Houston Co.'s campaign, and is reproduced as a cover design for the forty-eight-page "Mazda" lamp catalogue, and on all showcards and display material. The catalogue has four pages of colour depicting the range of coloured lamps and the new "Rodo" (architectural) lamp, and the "Mazda" sun lamp are described; outline lamp sketches showing dimensions are an additional feature.

The popular "Mazda Lamp Business Guide" reappears in a new light and dark blue cover, and contains information relating to lamps in a most concentrated form. A new four-page leaflet illustrates the whole range of "Mazda" coloured lamps in full colour. Two small price cards, dealing respectively with domestic and motor car lamps, have also been issued, while another new publication is a booklet entitled "Lamp Quality," containing the results of some very interesting tests carried out on "Mazda" lamps and non-Association lamps.

A Moulded Window-piece

In producing a small "Mazda" window display made of moulded composition the B.T.-H. Co. has departed from what may be called "the cardboard tradition." This display is in effect a circular box sign illuminated from within by a lamp connected to a thermal flasher. The whole of the casing and pedestal is made of moulded composition in green and black. The advertisement—a rendering of the famous "Dancing Girl" design—is contained between two sheets of glass, which are secured in the main moulding by means of a ring and four spring clips. A lampholder flasher and flexible cord are included.

Another display item is a cut-out showing the "Mazda Dancing Girl" on a large lamp. The small size and attractive colouring of this cut-out will undoubtedly make it very popular where window space is limited.

The design of the new "Mazda" automobile showcard is very unusual, and as in former years a complete price list of various type of "Mazda" bulbs is printed on the front.

"Change to Crompton lamps for economy" is the war-cry of Crompton-Kye Lamp Sales, Ltd. Among a quantity of particularly eye-catching publicity material is the "Pyramid" display, which is most effective for small or average size windows; it is supplied complete with lampholder and flasher. For larger windows there is the animated house display in which the various windows light up in turn with an indicator which suggests the size of lamp to be used in each room and the number of hours' use obtained per kWh.

A novel and attractive illuminated sign has a moulded lamp in relief on each side and moulded neon type letters. The lamp can be seen from any angle and the effect is striking, especially at night. Cut-outs, envelope price lists, larger lists for industrial buyers, rubber mats and various other aids can also be obtained.

A very picturesque window display can be built up round the Edison Swan Electric Co.'s centre-piece, showing the exterior of an inn and entitled "A Welcome Light." This is very effectively coloured and is made in one piece. It folds flat for dispatching and stands upon its own base without the aid of struts or locking devices. An interesting feature of this centre-piece is the inclusion of a secondary picture, an interior view of the house, which is sent out attached to the back of the display piece by means of three clips, and fits over the frontispiece of the display, thus allowing two displays to be used with the same cut-out.

A brightly coloured poster with a silver border urges the public to "get their money's worth from the mains" by fitting Ediswan lamps, and a handy-sized showcard gives in easily readable figures the prices of the standard lamps. Several leaflets and folders in attractive colours are also to be obtained.

Lamp window display materials which will soon be familiar to everybody

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Glasgow Corporation and Cable Tenders

It was stated at a recent meeting of Glasgow Transport Committee that twelve companies had sent in the same price for a particular quality of cable, and similar tenders had been received for a second contract. The committee agreed to place the contracts with non-combine firms.

Builders at the Lighting Service Bureau

Captain Chayter, of the Tamworth & District Electricity Co., recently arranged a visit to London, by road, of twenty-five local builders with a view to studying the latest developments in lighting. The party, which included the borough surveyor, Alderman Longley, chairman of the Housing Committee, and several local architects, inspected the Building Centre, the Shell Mex Building, and subsequently attended a lighting demonstration at the remodelled premises of the Lighting Service Bureau. The Bureau says that it is always willing to prepare a programme suited to the needs of such special groups of visitors.

New Australian Tariff Items

During the discussions on the tariff in the Australian Senate some new sub-items of electrical interest were added. One provides for duties on reduction gears imported for use with steam turbo-generators. The duties were fixed at free under the British preferential tariff and 15 per cent. *ad valorem* under the general tariff. Other new sub-items are turbines, steam or water, not exceeding 2,000 h.p., the duties being free and 15 per cent. *ad valorem*; parts of steam turbines exceeding 2,000 h.p. imported separately: (a) boxes and blocks, &c., free and 15 per cent. *ad valorem*, (b) other, 45 per cent. and 65 per cent. *ad valorem*; parts of water turbines, exceeding 2,000 h.p., free and 15 per cent.; other, 45 per cent. and 65 per cent. *ad valorem*.

German Conductor Wire Syndicate

The "Vauelfa," the syndicate of the United Conductor Wire Works of Berlin, is negotiating for the inclusion of the small works which still remain outside this combination. They number eleven, and if it should be found impossible to reach an agreement it is intended to ask the Government to appoint a commissioner to bring matters to a conclusion.

Electrical Apparatus Manufacture in China

An exhibition of machinery and technical apparatus, stated to have been visited by over 300,000 people, was held recently at the Chiao-Tung University of Communications in Shanghai. Although the display consisted mainly of foreign products, out of a total of 160 exhibitors thirty-six were Chinese, who showed among other goods Chinese-made electric motors, electrical fittings and radio apparatus.

Lamp Litigation in France

The Court of Appeal at Aix-en-Provence has recently given its decision in the appeal to the Société Française de Lampes Electriques (Zenith) against a verdict given against it for infringement of the tungsten filament lamp patents held by the Compagnie des Lampes. According to our French contemporary *L'Electricien*, the original verdict was sustained and the Zenith concern was ordered to pay 500,000 fr. damages.

New Russian Factories

The first factory in the Soviet Union for the production of electric kitchen appliances has just been finished at Yaroslavl, where a large electric motor works already exists. It is estimated that the new factory is capable of turning out 200,000 electric flat irons, 7,500 stoves, 100,000 tea-pots, 500,000 saucepans and 7,500 electric cleaners a year.—*Reuter's Trade Service.*

According to the *Moscow Daily News* the construction of a large electric rail-car factory has been commenced recently at Kashira, about twenty miles from Moscow. The works will be equipped to produce 300 electric cars a year.

Conditions in Turkey

The depreciation of sterling and increased interest now shown by British manufacturers in the Turkish market are the principal reasons for an increase in the United Kingdom's share of the trade, says a Department of Overseas Trade report on economic conditions. Owing to the application of the quota system, imports generally, however, show a marked decrease, and a further appreciable advance in British trade with the country cannot be expected. While the world-wide economic crisis continues there is no hope of any material improvement in trade conditions.

New Electricity Showrooms

The Folkestone Electricity Supply Co., Ltd., is shortly opening showrooms at 58, Sandgate Road.

New showrooms are being opened by the Boston and District Electricity Supply Co., Ltd., in the Market Place, Boston.

Management in Industry

A statement was issued last week, signed by Mr. E. S. Byng (managing director, Standard Telephones & Cables, Ltd.), Mr. A. P. Young (manager of the Rugby Works of the British Thomson-Houston Co., Ltd.), and several other prominent business men, discussing the progress made towards the formation of a British Management Council to carry out the objects of a manifesto issued at the beginning of the year entitled "The Management Factor in Industry." *The Times* says that the statement refers particularly to efforts made by a committee, set up as the result of the manifesto, to obtain joint action with the committee, appointed by the Federation of British Industries, to organise and conduct the International Scientific Management Congress to be held in 1935.

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GIVE TROUBLE-FREE SERVICE FOR YOUR DOMESTIC APPLIANCES
•ELIMINATES BREAKDOWNS AND ENABLES THE APPLIANCES TO WORK TO THE HIGHEST DEGREE OF EFFICIENCY
•THE OVERALL BRAID DOES NOT SLIP BACK OR UNRAVEL
•PLEASING COLOUR TO HARMONISE WITH ROOM DECORATION
MADE IN ENGLAND BY THE LIVERPOOL ELECTRIC CABLE COMPANY LIMITED

A neat new showcard sent us by the London Electric Wire Co. & Smiths, Ltd., advertising "Livaflex" non-kinking flexible cords

Fire Refined and Electrolytic Copper

Up to the end of June the new refinery of British Copper Refiners, Ltd., at Prescot, turned out some 14,000 tons of copper. Tests carried out by British Insulated Cables, Ltd., showed that in no instance has the conductivity fallen below 100 per cent. of the British Standard Specification; the mean figure has been 100.80 per cent., whereas out of fourteen brands of electrolytic copper tested by the B.I. since 1928 no fewer than nine have shown minimum conductivities less than 100 per cent.—some as low as 98.72 per cent. Only one brand of electrolytic copper compares favourably with B.C.R. copper. This is an Empire brand, and as 14,000 tons of it were used before the establishment of the new refinery, the comparison of conductivities is based on similar quantities. The following summary of tests during the past few years shows the position clearly:—

	Mean conductivity. Per cent.	Minimum conductivity. Per cent.
B.C.R. copper	100.80	100.11
Empire brand	100.81	100.10
Other brands	100.63	98.72

The New Leeds Civic Hall

Referring to the notes on this building which appeared in our last issue, Bull Motors inform us that Bull "Super Silent" a.c. motors were used in connection with the ventilating system.

For Sale

Walthamstow Electricity Department has a d.c. booster for sale.

A stock of electrical restaurant and domestic utensils and radio goods is to be sold by auction on September 14th by the West Central Merchandise Mart.

(See our classified advertisements.)

Recent Contracts

The D.P. Battery Co., Ltd., has recently supplied "Keepalite" emergency lighting systems to the Piccadilly Theatre, Manchester, and the Regal Cinema, Canterbury.

Radiovisor Parent, Ltd., has received an order for completing the installation of smoke indicators in the Barking power station of the County of London Electric Supply Co., making a total of eighteen instruments.

The Chloride Electrical Storage Co., Ltd., has received an order for an "Exide" battery of 220 cells, type "SFG/6," for the palace of the Dalai Lama, ruler of Tibet. Transport will be no easy task since the only means of conveyance is by mule, yak or coolie, and the 300-mile journey under these primitive conditions will involve special precautions in the packing of the glass boxes.

Ruston & Hornsby, Ltd., have received from Workman Clark (1928), Ltd., Belfast, an order for four 100-kW auxiliary generating sets for the *Incomati* now being built by them for Andrew Weir & Co., owners of one of the largest fleets of motor vessels in the world.

The Alton Battery Co., Ltd., has been awarded the contract for the battery equipment which consists of 122 cells of 1,500 Ah capacity required for the British Broadcasting Corporation's new Midland Regional transmitting station, situated near Droitwich.

The first British tugs to be equipped with Marconi wireless telephone installations will be the *Queen's Cross* and *King's Cross* belonging to Messrs. Robinson & Crosthwaite, Middlesbrough, contracts for 60-W wireless telephone-telegraph sets for these vessels having been placed with the Marconi International Marine Communication Co., Ltd., which is now completing their installation. These installations will enable the Cross Line tugs to communicate with each other and with the shore by either wireless telephony or wireless telegraphy, the wireless telephony range being in the neighbourhood of two hundred miles.

Trade Announcements

Messrs. A. W. Beuttell, Ltd., have changed their name to Linolite, Ltd., and have opened new branches at Messrs. Innes, Walker & Co.'s premises, 53, George Street, Edinburgh, and 348, Argyle Street, Glasgow.

The Harken Electrical Co., Ltd., has removed its works to more commodious premises at 18a, South End, Croydon.

Nelco, Ltd., has moved its registered office to Auto Electric Works, Station Road, Shalford, Guildford, and will in future supply its London customers daily by van from Shalford.

As their present factory has become inadequate to cope with growing business Messrs. F. C. Blackwell & Co., manufacturers of "Blaco" conduit joints and fittings, have recently acquired a site adjacent to the old premises at Great Crosby, Lancs, and are building a modern factory which, when complete, will have more than three times the floor space of the old building. The factory is nearing completion and production will probably commence at the beginning of October. Following the move it is probable that a number of new "Blaco" lines will be introduced.

Social Event

The Clesco Sports and Social Club of the County of London Electric Supply Co., Ltd., and Associated Companies held its seventeenth annual horticultural show and garden party at the sports ground, Raynes Park, on August 26th. The occasion was favoured by fine weather which resulted in a record attendance. The Harry Renwick Memorial Cup was won by head office (Mr. A. Butler, captain), the Lady Renwick Memorial Challenge Cup was awarded to Mr. F. O. Arnett (head office), and the cup presented by Mr. A. R. Bacon was won by Mr. F. Cowland (Purley). Lady Bethell, wife of Sir Thomas Bethell, J.P., a director of the company, presented the prizes. In addition to the horticultural exhibits there were many other attractions, including sports, a concert party, fireworks and open-air dancing, with music by the Clesco Dance Band and the Advance Sound Apparatus Co.

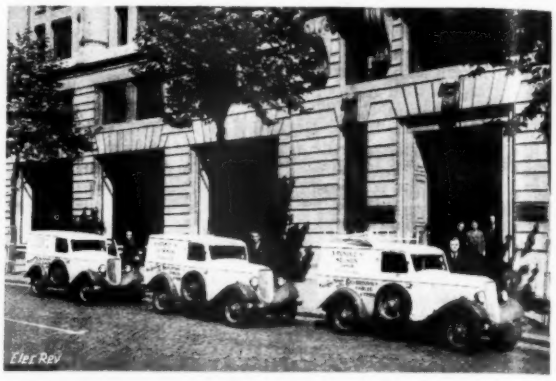
Success of Radio Exhibition

An official statement issued by the organisers of the Radio Exhibition, which concluded at Olympia on Thursday last week, quotes very big figures respecting the business done. An estimate based on certain orders received suggests that during the coming season the industry will produce 1,250,000 receivers (£14,400,000); 13,000,000 batteries (£6,000,000); 3,800,000 valves (£2,300,000); 7,400,000 other components and accessories (£3,500,000). Of the receiver business that the Radio Exhibition has initiated, it is estimated that during the season approximately 2,000,000 sets will be sold, 750,000 being to new owners and 1,250,000 replacements of obsolete models. The Radio Manufacturers' Association will open its first Scottish Exhibition in Kelvin Hall, Glasgow, to-day, and this will be followed by one commencing at Manchester on September 27th. It is anticipated that the result of the three exhibitions will be a turnover of £40,000,000, as against £36,627,425 last year. The increased business will necessitate new factory space to the extent of 250,000 sq. ft., and it is stated officially that the industry will be able to absorb another 150,000 workpeople.

The new Siemens "Full o' Power" radio battery window display centrepiece depicts the Mount Everest Expedition which employed these batteries

Silvertown Sales Campaign

On Monday last the Silvertown Company commenced an intensive sales campaign in the northern and southern counties by means of a fleet of vans which will call on practically every dealer in these territories. The length-marking device now standardised on all cables made by the company has led to an immense amount of new business, and the addition of this new fleet of vans will ensure prompt and efficient service. The sales campaign is to continue for a fortnight.



The new fleet of cars with which the Silvertown Co. is carrying out an extensive sales campaign

New Australian Companies

New companies registered recently in Australia include:—British Electric Cleaners (N.S.W.), Ltd. (capital £15,000), Kent House, Liverpool Street, Sydney; and the Aristone Radio Co. (Australia) Pty., Ltd. (capital £10,000), 230, Chapel Street, Prahran.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, August 30th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2 to 29	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£195	—
Grade II ... ... ,,	£134	—
Grade III ... ... ,,	£66	—
c Brass (rolled metal 2" to 12" basis) per lb.	7⅞d.	—
c ,, Tubes (solid drawn) ... ... ,,	9½d. to ¼d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn) ... ,,	10½d.	—
g ,, Bars (best selected)... ... per ton	£66	£2 dec.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£42 10s.	—
d ,, ,, Sheets ... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£47 10s.	—
d ,, ,, H.C. Wire ... per lb.	7⅛d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5½d.	¼d. dec.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English Pig ... ... ,,	£13 15s.	5s. inc.
g Mercury ... ... per bot.	£8 7s. 6d. to £9	2/6 dec.
e Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/0½d.	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8½d.	—
r Steel, magnet, in bars ... ... ,,	7½d.	—
m Tin, Block (English) ... ... per ton	£220 10s. to £222 10s.	£5 10s. inc.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/5	—

Quotations supplied by:—

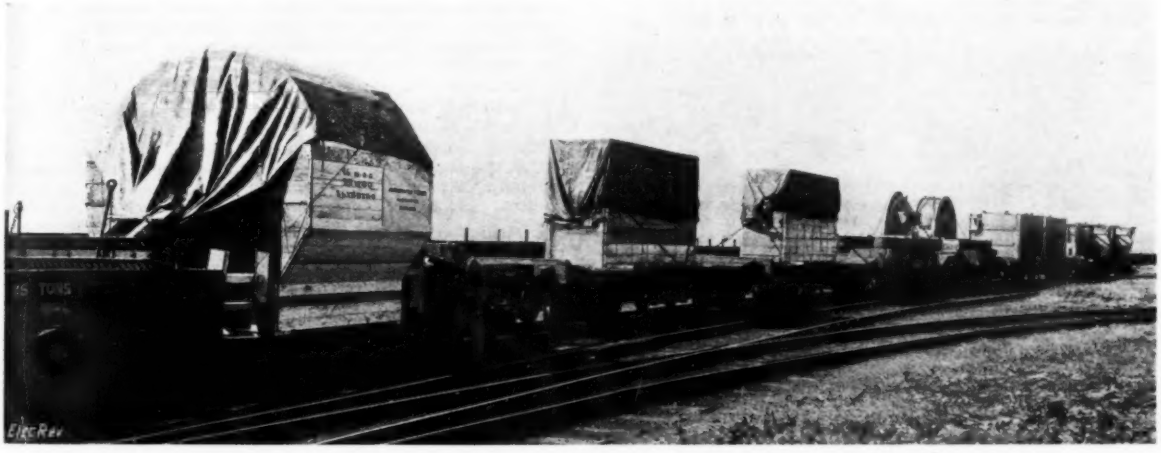
a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

Another Radio Wholesalers' Association?

Nearly a hundred persons were present at a meeting held last week to consider the formation of another association for the wholesale section of the radio trade. The objects of the association, says the *Wireless and Gramophone Trader*, would be to protect the interests of wholesalers and to act as an intermediary between manufacturers and wholesalers, more especially in determining the basis of distribution and discounts, and to remedy any grievance which the wholesaler may have in connection therewith. It is intended to institute later a status inquiry bureau for the protection of credit contracted by members. To determine the objects, regulations and basis of the proposed association, a committee composed of the following gentlemen has been appointed: Messrs. A. S. McHugh (A. S. McHugh & Co.); W. Wolsey (V. Zeitlin & Sons); W. A. Cooke (Faudels, Ltd.); H. L. Levy (London & Provincial Factors, Ltd.); Mr. Marshall (Sheffield Radio & Electrical Co.); A. Chilton; T. D. Young (T. D. Young & Son, Ltd.); and W. Crift (Young & Wildsmith).

Large Machinery for South Africa

Last Saturday evening a special goods train of sixteen wagons left the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd., for Birkenhead Docks. It contained a winding motor of 2,500 h.p. for the New Consolidated Goldfields Sub-Nigel winder. This was loaded in three parts, the armature weighing nearly thirty tons, the top half of the field weighing over twenty tons, and the bottom half nearly twenty-four tons. These parts were on special trucks and the armature had to be set out of gauge on account of its width. This necessitated the clearing of both lines during the passage of the train, which also carried parts of a large steam condenser of 24,000 sq. ft. capacity for a 24,000-kW turbo-generator set for the Randfontein Estates Gold Mining Co.



An outsize in "Metrovick" winding motors leaving the Trafford Park works for a South African gold mine

The Cottages in the Strand

The Minister of Health has indicated that he will raise no objection to the erection by local authorities or others of cottages to the design of those erected for demonstration purposes on the Aldywch site, Strand, from the winning design in the Building Centre Cottage Competition, one of which is all-electric.

New Catalogues and Lists

Chloride Electrical Storage Co., Ltd., Clifton Junction, Manchester.—Particulars of reductions in the prices of "Drydex" batteries.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflets dealing with gauge-type pressure switches with relays, triple-pole or double-pole push-button starters, across-the-line type automatic motor starters, lift car or reversing master switches and weight controlled q.m. and b. float switches. Also a pamphlet (No. 6803) containing illustrations and brief details of the company's push-button equipment.

Newtons of Taunton, Ltd., 319, Regent Street, W.1.—A catalogue of "Rotax" electric drills of many patterns, valve refacers, &c. Fully illustrated. Further designs are in hand. Also particulars and prices of a new range of battery-charging equipment.

Power Contracts (Batwin), Ltd., 138, Southwark Street, S.E.1.—A list describing the new British Batwin electric motor.

Linolite, Ltd., 96, Victoria Street, S.W.1.—Catalogue No. 33 giving particulars of "Linolite" strip reflectors for concealed lighting purposes.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—A catalogue giving details of Marconiphone products for the 1933-34 season, and a booklet containing a complete list of Marconi valves.

Manor Electric Oven & Fire Co., Ltd., 7, Sutton Street, W.1.—A leaflet giving particulars of the new "Manor" immersion heaters.

A. F. Bulgin & Co., Ltd., Abbey Road, Barking.—The 1933-34 season's catalogue of radio products, with announcements of a number of reductions in prices.

Petters, Ltd., Westland Works, Yeovil.—Cards giving sizes and particulars of a new series of atomic Diesel stationary and marine engines.

Geyser Manufacturing Co. (1932), Ltd., 1, Goodwin Street, Fonthill Road, Finsbury Park, N.4.—Particulars of the company's new electric water heaters.

Turners Asbestos Cement, Ltd., Trafford Park, Manchester.—A folder on "Siluminite" asbestos electrical insulating and arc-resisting mouldings.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—Catalogue No. 813 dealing with "Siemens" electrical indicators for heat economy and control.

McLeod & McLeod, Ltd., 329, High Holborn, W.C.1.—A leaflet on the "Doelcam" electric iron, bar and bowl fires, and toasters, giving reduced prices.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.—Publication No. A.900 illustrating and describing a moulded ceiling rose with a new and improved interior.

Thos. W. Ward, Ltd., Albion Works, Sheffield.—Leaflets on lathes, sawing, drilling and grinding machinery.

Sturge & Baker, Ltd., Sheepcote Street, Birmingham.—List No. 10 giving new designs and revised prices of "Red Rose" fires, "Stowaway" table lamps, flex absorbers, bedwarmers, &c.

British Ebonite Co., Ltd., Nightingale Road, Hanwell, W.7.—A price list of ebonite sheets, panels, rods, tubes and formers; all prices of panels have been considerably reduced. Also a handbook (price 6d.) on tuning coils.

Mullard Wireless Service Co., Ltd., 111, Charing Cross Road, W.C.2.—A Mullard valve guide containing 88 pages.

Siemens Bros. & Co., Ltd., Woolwich.—Two brightly coloured cut-outs relating to "Full o' Power" radio batteries.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—Folder O.S. 6639 describing "Osram" tubular lamps.

Electrical Equipment & Carbon Co., Ltd., 107/111, New Oxford Street, W.C.1.—List No. MR.2 on mercury arc rectifiers.

Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.—A pocket price list (No. 7020/0-2) covering standard a.c. and d.c. electric motors and control gear from ½ to 50 h.p.

Company Liquidations

F. J. Jones & Co., Ltd., electrical engineers, The Eastgate, Chester.—The statutory meeting of creditors was held on August 19th, at Chester, when the statement of affairs showed liabilities of £4,744 and assets of £2,138. After allowing £198 for preferential claims, the net assets were £1,940, leaving a deficiency of £2,804. The present position was attributed to faulty management and to the expenses being too heavy in relation to the turnover. The appointment of Mr. F. E. Board, 22, High Street, Sheffield, as liquidator, was confirmed, and a committee of inspection was elected, consisting of the representatives of Electric Lamp Factors, Ltd., and Callender's Cable and Construction Co., Ltd.; Mr. P. S. Booth, Mr. A. Cripwell, and Mr. W. W. Potts. The following are the principal creditors: Callender's Cable & Construction Co., Ltd., £393; Electric Lamp Factors, Ltd., £377; International Refrigerator Co., Ltd., £266; Kelvinator Refrigerator Co., Ltd., £224; S. Thornton, £171; Hall, Crabtree & Heap, £145; General Electric Co., Ltd., £130.

Radio Vacuum Cleaners, Ltd.—Winding up voluntarily. Liquidator, Mr. N. Keith Silver, 4-6, Throgmorton Avenue, E.C.2.

All Electric House Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Keeling, 83, Colmore Row, Birmingham.

William Hoyes, Ltd.—Particulars of claims by September 18th to the liquidator, Mr. C. Turner, 155, Norfolk Street, Sheffield.

Bankruptcy Proceedings

Bessie Cohen, radio dealer, 35, Heathland Road, Stamford Hill.—The statutory first meeting of creditors was held on August 25th at London Bankruptcy Buildings. The debtor stated that she began business in August, 1931, with £28 capital at 2, New Street, Goulston Street, E., and drew £4 weekly for her household and personal needs. The trading was not a success, and at the expiration of seven months in March, 1932, she closed down and returned the remaining stock to the wholesalers. The receiving order was made on the petition of the Telsen Electric Co., Ltd., and the failure was due to the bad situation of the shop premises. The liabilities amounted to £200, and in the absence of assets the case was left in the hands of the Official Receiver.

J. Segall, radio and electrical dealer, 4, Argyle Close, Ealing, Middlesex.—The public examination was held recently at the Court House, Half Acre, Brentford. A statement of affairs was submitted which showed estimated liabilities of £354 and no assets. Debtor said that in August, 1930, while in employment, he commenced business as an electrical and radio dealer at premises in Pitshanger Lane with a capital of about £350. He spent £80 on shop fittings and obtained a battery-charging plant on hire-purchase terms for £70. Debtor ceased trading in September, 1932, and then handed over the charging plant to a creditor who had advanced money to the extent of £25. The plant was afterwards repurchased by debtor's wife, who commenced a similar business. The examination was adjourned.

H. Cohen, radio dealer, lately of 385, Mile End Road, E.—A receiving order was made against this estate on the petition of Delta Radio Distributors, Ltd., and on August 22nd the statutory first meeting of creditors was held at London Bankruptcy Buildings. The Official Receiver reported that the debtor had not attended under the proceedings and that an inspector had visited 385, Mile End Road, when he was informed that the debtor vacated those premises on June 10th last. No particulars were given of liabilities or assets. The case was left in the hands of the Official Receiver.

W. R. C. Purves and **S. Bell,** trading in co-partnership as the Vulcan Radio Co., radio dealers, 2, Murray Road, Workington, Cumberland, formerly trading in co-partnership as Purves Bell & Co. (1928), 18, Warwick Place, Workington.—These debtors attended at the Court House, Nook Street, Workington, recently for their public examination. A joint statement of affairs had been lodged which disclosed a deficiency of £135. The failure was attributed to lack of capital and over estimating the amount of prospective business. The examination was closed.

C. E. Moore, wireless engineer, trading as C. E. Moore & Co., 35, High Street, St. Neots, Hunts.—The first meeting of creditors was held recently at the Official Receiver's office, 41, Sidney Street, Cambridge, when the statement of affairs showed gross liabilities of £2,731, of which £1,696 was expected to rank for dividend, and assets of £647, leaving a deficiency of £1,049. The position was attributed to keen competition, heavy overhead charges, and general trade depression. Mr. W. A. J. Osborne, Finsbury Pavement, London, E.C., was appointed trustee.

J. H. Withycombe, electrical engineer and wireless dealer, 61, High Street, Barnstaple.—This debtor filed his own petition recently, and according to the statement of affairs there are gross liabilities of £1,432, of which £1,164 is expected to rank for dividend, whilst the net assets amount to £484, leaving a deficiency of £680. Debtor attributes his failure to over-buying and giving too much credit. He has been endeavouring to dispose of the business. First meeting held August 29th. Public examination, September 28th, at the Guildhall, Barnstaple.

B. M. Cowper and **L. J. White** (trading as "Mac's Radio"), electrical engineers and wireless dealers, 497, Bristol Road, Bournbrook, Manchester.—Receiving order made August 21st on debtors' own petition. First meeting September 6th, at the Official Receiver's office, 159, Great Charles Street, Birmingham. Public examination October 4th, at the Court House, Corporation Street, Birmingham.

C. Morris, radio dealer, 3, Bergholt Crescent, Stamford Hill, London (lately carrying on business in Parker Street, Kingsway, and Judd Street).—Receiving order made August 23rd on a creditor's petition. First meeting, September 4th; public examination, December 8th; both at Bankruptcy Buildings, Carey Street, W.C.2.

E. Brown, wireless dealer, trading as the World's Wireless Stores, at 10 and 12, Grosvenor Parade and Forsdick Yard, Melbourne Road, Wallington, and as J. Morton at 3, Church Yard, Croydon.—Application for discharge to be heard on October 26th at the County Court, Croydon.

G. Clark and **C. W. Pullen** (trading in partnership as the Northern Motor Sign Co.), electrical sign specialists, 9, Oxford Street, Manchester.—First and final dividend of 5⅔d. in the £, payable August 25th at the Official Receiver's Office, Byrom Street, Manchester.

J. I. Dangerfield, wireless, electrical, &c., engineer, 25, New Street, West Bromwich.—First and final dividend of 5⅔d. in the £, payable August 31st, at the Official Receiver's office, 159, Great Charles Street, Birmingham.

D. I. Phillips, fitter and electrical dealer, Forge Road, Machen.—First meeting to-day (September 1st) at 34, Park Place, Cardiff. Public examination, October 10th, at the Town Hall, Newport.

L. H. Potter (trading as the Norwich Radio Co.), wireless retailer, 13 and 15, St. Giles Street, Norwich.—Application for discharge to be heard on September 13th at the Shirehall, Norwich.

B. Bell, electrical engineer, Ladbrooke House, London Road, Biggleswade.—Trustee, Mr. T. Keens, 11, George Street West, Luton, appointed August 19th.

E. V. Russell (trading as the Skegness Electric Service), 2, Tennyson Buildings, Drummond Road, Skegness.—Receiving order made August 19th on a creditor's petition.

T. W. H. Fairclough, electrical and motor engineer, The Garage, Trusthorpe, Mablethorpe, Lincs.—Receiving order made August 21st on debtor's own petition.

A. S. Deacon (London Wireless Co.), wireless dealer, 32, London Road, and 127, Pear Tree Road, Derby.—Trustee, Mr. F. E. Bendall, Midland Chambers, 3, Warwick Passage, Corporation Street, Birmingham, released July 28th.

Private Arrangements

D. McGibbon, electrician, 172, Byres Road, Hillhead, Glasgow.—At a recent meeting of creditors held in Glasgow, the statement of affairs showed liabilities of £569 and assets totalling £135. After allowing £49 for preferential claims, the net assets were £86, leaving a deficiency of £483. The estate showed an approximate dividend of 3s. 6d. in the £, subject to costs of realisation. The business was taken over by Miss McGibbon and her brother from their father's estate when he died about fifteen years ago. Both had suffered from ill-health, and Miss McGibbon died about a year ago. Since 1928 the business had not been profitable. It was decided that the estate should be wound up under a trust deed in favour of Mr. Muir, and that an endeavour should be made to induce a cash creditor to withdraw his claim. A committee of inspection was also appointed.

T. W. G. Budgett, electrical engineer, Station Square, Amersham.—Particulars of claims to the trustee, Mr. P. F. Keens, 11, George Street West, Luton, by September 5th.

Electricity Supply

Aberdeen.—PRICE REDUCTIONS FOLLOW SUCCESSFUL YEAR.—Mr. J. A. Bell, city electrical engineer, reports that the total income of the Electricity Department for the past year was £240,123, while the total working expenses were £98,991, leaving a gross profit of £141,132 and a net profit of £21,735. Mr. Bell states that the year was marked by a reduction in working costs and total costs, both of these being the lowest yet obtained. There were forty-eight public and private substations and kiosks in operation, and new consumers to the number of 2,417 had been added during the year. The Electricity Committee recommends: a reduction in the lighting flat rate from 3½d. to 3d. per kWh, with a minimum charge of 10s. per meter per half-year; that the charge for electric current for motive power be 2d. per kWh for the first 125 kWh, per quarter, 1½d. for the next 125 kWh, 1½d. for the next 1,250 kWh, and 1d. for the next 3,500 kWh; and that the charge for heating and cooking be 1d. per kWh for the first 250 kWh per quarter, ¾d. for the next 500 kWh, and ½d. for all over 750 kWh, the minimum charge to be 10s. per meter.

Allendale (Northumberland). — STREET LIGHTING. — The parishioners have adopted a street lighting scheme estimated to cost £980. The North-Eastern Electric Supply Co., Ltd., is to undertake the work.

Barnsley.—THE DOMESTIC TARIFF.—The Town Council has reduced the "unit" charge of the domestic two-part tariff from ¾d. to ½d. all the year round.

Bootle.—PUBLIC LIGHTING.—The Rural District Council has accepted the tender of the South Cumberland Electricity Supply Co., Ltd., for public lighting at Seascale for seven years. The existing gas lamps will be converted.

Darlington.—MAINS EXTENSIONS.—Mains extensions are to be carried out by the Town Council in the Thompson Street, North Road, Holmwood Grove, and Park Place areas.

Dewsbury.—REVISION OF CHARGES.—The Electricity Committee has decided that the minimum rateable value charge for electricity supplied to private houses of a rateable value of £12 and under shall be £1 16s., and in the case of houses of over £40 rateable value the charge on the rateable value in excess of £40 shall be reduced from 15 per cent. to 12½ per cent. A reduction in prepayment meter rents at the rate of ¼d. per kWh consumed for lighting is also to be made.

ELECTRIC STREET LIGHTING.—The Gas and Water Committee has had quotations from the Mirfield Gas Co. and the Electricity Department for street lighting at Ravensthorpe, and has accepted that of the Electricity Department at £662 per annum.

Dolgelley.—SUPPLY EXTENSIONS.—The North Wales Power Co. hopes to provide a supply to the villages of Dyffryn and Llanbedr by the winter. The Rural District Council is to urge the land-owners not to present any difficulties in the matter of wayleaves.

Douglas (I.O.M.).—REDUCED CHARGES.—In connection with the note which appeared in our issue of August 18th (p. 230) relating to reductions in electricity charges, Mr. Bertram Kelly, the borough electrical engineer, informs us of another important reduction, *viz.*, the lowering of the "unit" charge of the all-in tariff from 1d. to ¾d. less 5 per cent. discount. The flat rate for cooking has also been reduced from 1 3/16d. to 1d. per kWh less 5 per cent. discount.

Dundee.—DISPLACED EMPLOYÉS.—The Electricity Committee was informed last week that twenty-eight claims for compensation from workmen had been received following the taking over of the generating station at Carolina Port by the Central Electricity Board. Eleven of the claims were for loss of employment while the balance related to men now in other situations. The town clerk is to consider the claims with the referee appointed by the Ministry of Labour.

Earby.—ELECTRICITY FOR KELBROOK.—The Electricity Commissioners have approved the Council's proposal to extend the electricity supply to Kelbrook. The Council is depending on the Nelson Corporation for the bulk supply required, and if for some unexpected reason there are delays it is suggested that a special cable could be run from Sough to give a temporary supply. The cost of the scheme will be about £2,100.

Elham.—UNDERGROUND CABLES TO LYMPNE.—The Rural District Council has been informed that the Air Ministry insists on the use of underground cables for supplying electricity to Lympne, owing to the proximity of the parish to an aerodrome.

Etchingham.—SUPPLY TO HURST GREEN.—The Weald Electricity Supply Co., Ltd., is making a canvass with a view to extending the supply cables from Hurst Green.

Farnworth.—APPARATUS FOR HIRE.—The Electricity Committee is seeking sanction to borrow £7,000 for apparatus for hire.

THE ALL-IN TARIFF.—Fires and water-heating apparatus are

to be included in the list of apparatus which entitles the consumer to the ½d. per kWh charge under the "all-in" tariff.

Felixstowe.—NEW METERS.—The Electricity Committee has obtained sanction to the borrowing of £2,020 for meters.

Fleetwood.—INCREASED PROFITS.—Despite two substantial reductions in tariffs, the electricity undertaking made a net profit of £8,269 last year, against £6,101 in the preceding year.

Gainsborough.—LARGE INCREASE IN CONSUMERS.—Mr. H. Breckell, engineer and manager of the Electricity Department, states in his annual report that electricity sold last year amounted to 2,503,200 kWh, an increase of 18 per cent. over the previous year. At March 31st there were 1,183 consumers, representing an increase of 40 per cent. during the year, and the total revenue increased by 20 per cent. to £15,628.

ASSISTED WIRING.—The Council has decided to introduce an assisted wiring scheme, and application has been made for sanction to borrow £3,800 to cover the cost of the necessary installation work and the prepayment meters.

Irish Free State.—LOUGH ALLEN PROPOSAL.—A scheme, costing approximately £100,000, is about to be undertaken by the Electricity Supply Board for providing additional storage in Lough Allen, County Leitrim. To make provision for further extensions of the Shannon Scheme, the aim of the new undertaking is to treble the outflow for Lough Allen by excavating a channel at the entrance to the lake, and this will involve the wedging of about 255,000 cu. yd. of earth and 35,000 cu. yd. of rock. The existing sluices are to be replaced by lower ones at the outlet from the lake, necessitating reconstruction of three bridges. In this way a free outlet for Lough Allen will be secured, which will bring a greater flow of water to Lough Rea, and thence to Lough Derg, which is the basin that supplies Ardnacrusha.

Ixworth.—STREET LIGHTING.—The Parish Council has decided to have electric street lighting installed.

Japan.—POWER STATION EXTENSIONS.—The Tokyo Electric Light Co. is contemplating extending the capacity of its Tsurumi thermal power station from 100,000 kW to 300,000 kW.

Kingston.—ELECTRICITY CHARGES.—The Electricity Committee is to interview the Electricity Commissioners regarding a proposal to introduce a two-part tariff and is considering requests for reductions in charges to theatres and cinemas. The following charges have been fixed for water heating:—From 7 a.m. to 9 p.m., ¾d. per kWh; from 9 p.m. to 7 a.m., ½d.; meter and time switch, 12s. 6d. a quarter.

Leyton.—WIRING OF CONSUMERS' PREMISES.—The Electricity Committee is to consider further a suggestion to dispense with the present system for the wiring of consumers' premises and to substitute a fixed price per point for all wiring work, with a roster of selected local contractors who would be allocated work in rotation. The borough electrical engineer is to interview local contractors on the matter and report as to the Department's ability to undertake some of the work.

Llandudno.—LIGHTING OF RAILWAY STATION.—The L.M.S. Railway Co. is considering the installation of electricity at the railway station.

Llanelly.—SUPPLY TO FERRYSIDE.—Llanelly and District Electric Lighting and Traction Co., Ltd., has acquired the interests of the Ferryside Electric Co. It is proposed to provide the supply for Ferryside by means of a h.p. line from Kidwelly, through Llansaint and Broadley, and the constructional work will start immediately.

London.—PERMANENT FLOODLIGHTING SCHEMES.—A scheme is being discussed by the London Society for the permanent floodlighting of some of London's most important buildings.

POLICE LIGHT SIGNALS.—A system of flashing light signals to be placed on police telephone boxes to warn policemen that they are needed is to be extended throughout the London City Police area, says the *Daily Mail*.

STOKE NEWINGTON.—Three brief failures occurred in the electricity supply of the borough in a short space of time during the evening of Thursday last week. It appears that the trouble occurred in the bulk supply cable running into the area from Hackney.

Morecambe.—THE ILLUMINATIONS.—This year's illuminations commence this evening and will continue until September 24th. The lighting scheme will be continuous over three miles of promenade, and to-morrow, when the carnival and Venetian water fête start, there will be electrical illuminations on the water and fifty boats will be electrically lighted.

Morton.—PROSPECTS OF A SUPPLY.—The Yorkshire Electric Power Co. has asked the Gainsborough Urban District Council for terms for extending the supply of electricity to the village, where a satisfactory canvass has been made. The Council's cables run close to the parish.

Northern Ireland.—BELFAST.—A report outlining three schemes for the supply of electricity to north and north-west Belfast has been submitted to the Electricity Committee. One scheme involves laying cables across the harbour channel from the electricity works, while another scheme proposes the use of overhead lines. A third scheme would involve joint working with the Electricity Board, and would probably lead eventually to supplying electricity from the Belfast station to all parts of Northern Ireland.

Penrith.—LIGHTING SCHEME REJECTED.—The parishioners of Great Salkeld have rejected a proposal to light the village by electricity. The proposal would involve a 3½d. rate.

Radnage.—A MORE PROMISING OUTLOOK.—Since we published the note in our last week's issue regarding the prospects of a supply at Radnage, Mr. P. Orchard, of the Wessex Electricity Co., has informed us that negotiations are proceeding with the Wycombe Rural District Council for a small water-pumping load. If, as is almost a certainty, this scheme is proceeded with it is quite likely that arrangements will be made for the general supply of Radnage and district this winter.

Saddleworth.—INFORMATION WITHHELD.—There has been a little friction between the local lighting committee and the Stalybridge, Hyde, Mossley and Dukinfield Electricity Board concerning the withholding of information that is wanted by the Saddleworth Council. Saddleworth has asked for a statement of income and expenditure for electricity for the whole of the Saddleworth area, and as this is not forthcoming it has been decided to approach the Electricity Commissioners with a view to securing this information.

Sheffield.—SUPPLY TO TOTLEY BENTS.—The Corporation is to provide a supply of electricity to Totley Bents.

Sileby and Queniborough (Leics).—RURAL SUPPLIES.—The two villages are to be given an electricity supply by means of overhead lines.

Southampton.—EXTENSIONS.—The Corporation is to provide electricity to the Pirrie Park Estate (£2,500) and to the premises of Messrs. Morant Bros. at Harrison Road, Portswood (£498). Sanction has been received to loans of £1,038

The waterfall at the Shrubbery, Southend, illuminated with constantly changing lighting during the Carnival Week

for supplies to Redbridge, £3,691 for Burseldon, and £5,155 for Hedge End.

FURTHER FACILITIES.—The apparatus-hiring scheme is to be extended to include hot-water storage tanks, and rents are to be reduced under the hiring scheme, which also include the supply and maintenance of apparatus and wiring, these rents to be based on an annual return of 10 per cent. of the cost to the Department of the apparatus and of the wiring, when required.

SCHOOL LIGHTING.—The Education Committee has arranged for the Electricity Department to improve lighting at three schools (£100).

Stalybridge.—FREE SERVICE.—The Stalybridge, Hyde, Mossley and Dukinfield Electricity Board has adopted a suggestion of the electrical engineer (Mr. Lumsden) that new consumers taking a supply of electrical energy for lighting and heating purposes, together with any two of the following appliances, *viz.*, cooker, washboiler or water heater, shall be allowed a free service up to 20 yd. from the premises requiring a supply.

St. Austell.—NEW SUB-STATION.—The St. Austell and District Electric Lighting & Power Co., Ltd., is to erect a sub-station in South Street.

Todmorden.—REDUCTION IN APPLIANCE CHARGES.—The Electricity Committee is to reduce the quarterly payments for the hire of electric washers to 13s. and for cookers now charged for from 6s. and over to 5s.

OVERHEAD LINES.—Sanction has been obtained to the erection of overhead lines to Cross Stone.

EXTENSIONS.—The electrical engineer has been empowered to furnish supplies of electricity where the capital outlay involved does not exceed £50, subject to satisfactory guarantees for the payment for period of five years of a minimum annual sum of 20 per cent. of the capital outlay involved.

MAINS AND SERVICES.—Permission has been obtained to borrow £10,000 for mains and services.

Walthamstow.—ASSISTED WIRING.—The Electricity Committee is applying for sanction to a loan of £20,000 for assisted-wiring installations.

Traction

Australia.—PROPOSED ELECTRIC RAILWAY EXTENSIONS.—Sutherland Shire Council has asked the Minister of Transport to consider a scheme for the extension of the electric railway from Sutherland to Cronulla, a suburb of Sydney. Including the construction of five new railway stations, the estimated cost of building the line is about £250,000.

BOW COLLECTOR EXPERIMENTS AT BRISBANE.—Experiments with the bow collector for trams are being carried out at Brisbane.

Darlington.—Tenders have been received by the Town Council for the supply of additional trolley-buses, and the matter has been referred to a sub-committee.

Germany.—OPEN-TOP TRAMS.—Canvas roofs which can be rolled back in warm weather have been fitted to several trams in Leipzig.

Glasgow.—PROGRESS OF SUBWAY ELECTRIFICATION SCHEME.—The work of electrifying the Glasgow Subway is to be commenced immediately by the Transport Department. The Ministry of Transport, after several weeks' consideration, has now approved the scheme, the revised estimated cost of which is £117,000—£17,000 more than the original estimate. The increased cost is due to the Ministry insisting on the scrapping of all the wooden platforms in favour of granolithic ones to reduce the danger of fire. The scheme will take at least a year to complete, and will be carried out during the night and at the week-ends by the maintenance staff of the Transport Department. A section of the Subway—that between Govan Cross and Partick—has already been electrified.

SEATS FOR TRAM DRIVERS.—As an experiment, drivers of Corporation trams are being provided with portable seats.

Japan.—RAILWAY ELECTRIFICATION.—A Yokohama correspondent reports that the Government Suita-Akashi line is making steady progress, and that the entire line is likely to be in operation by July next year.

London.—UNDERGROUND STATION IMPROVEMENTS.—Developments at a number of Underground stations, which have been undertaken to meet the greater traffic interchanges expected to follow suburban line extensions in the last three years, are due for completion at the end of September or before the end of the year, says *The Times*. Those at Hyde Park Corner were finished in time for the opening of the station last May. Stations where new booking offices and escalators or other reconstructions are nearing completion are Knightsbridge, Green Park, Leicester Square, Holborn, Chancery Lane, Bank, and the Monument.

FURTHER ROAD-RAIL FACILITIES.—The London Passenger Transport Board announces that as from to-day (Friday) road-rail tickets issued for journeys *via* Tooting Broadway Underground station to and from certain City and West End stations will be available on either trams or buses.

South Africa.—JOHANNESBURG TRAMWAYS.—Johannesburg City Council has decided to send a deputation to the Transvaal Administrator to urge his consent to a loan of £232,000 for a transport scheme, which includes the purchase of a number of new tramcars. The Tramway and Lighting Committee stresses the urgency of the proposals, as a considerable number of the existing tramcars are getting into such a bad condition that it will shortly be necessary to spend a large sum of money on reconstructing them, which would be unnecessary if new cars were purchased to replace the obsolete vehicles. Reconstruction of these tramcars is not favoured.

United States.—OIL-ELECTRIC LOCOMOTIVES.—There are now forty-nine oil-electric-battery locomotives in the United States, of which forty-two have 300-h.p. oil engines and 624-Ah batteries weighing seventeen tons, which give 800 h.p. for short periods. When taking current from the overhead line at 600 V the one-hour horse-power is 1,600. Two further 111-ton locomotives (see illustration) have 340-Ah batteries and take outside current at 3,000 V.

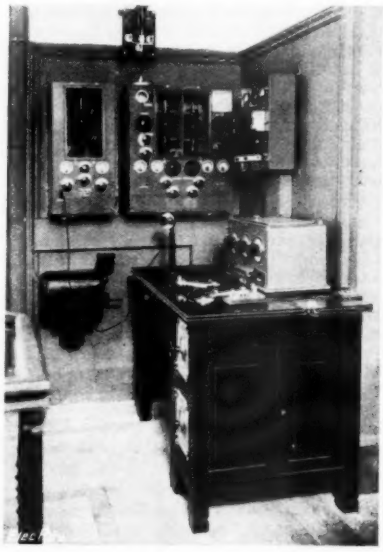
An oil-electric locomotive in use in the United States

Windsor.—TRAFFIC SIGNALS.—Berkshire Highways Committee recommends the provision of automatic traffic signals at the junction of St. Leonards Road and Oxborne Road, Windsor, at a cost of £400.

Communications

Belgium.—LICENCES.—At June 30th the total number of radio receiving licences issued was 400,284 (including 6,872 free licences for the blind, &c.), an increase of 128,705 during the preceding year.

Brazil.—WIRELESS FOR POLICE.—A highly organised police wireless service has been instituted by the Federal authorities of Brazil for inter-communication between the central police station in Rio de Janeiro and provincial police stations and motor-cycle patrols, and also for communication between the Rio de Janeiro marine police station and vessels in the harbour or at sea. The principal wireless station is that at the police headquarters in Rio de Janeiro, which is equipped with two Marconi transmitters—for medium-wave and short-wave working — and two receivers. Both transmitters are suitable for either telephone or telegraph operation, and the medium-wave station is to be employed for a "broadcasting" service as well as for police communications. The broadcasting service will comprise a "police hour" during which will be radiated at a convenient time each day police news and notices of value and interest to the public. The short-wave station also carries out a number of valuable auxiliary services in addition to its routine duties of internal police communications, being capable of communication with all the Brazilian States and a large number of foreign countries.



The Marconi short-wave transmitter and receiver installed at the marine police station, Rio de Janeiro

Germany.—LICENCES STILL DECREASING.—The number of broadcast receiving licences has been steadily decreasing since the beginning of May, and at August 1st the total was 4,483,278—37,828 fewer than on July 1st. Of this total 531,230 were issued free to the unemployed.

NEW STATION FOR BERLIN.—It is hoped that the new 60-kW broadcasting station at Tegel, Berlin, will be in operation by the end of the year.

Great Britain.—RADIO RELAY SERVICES.—The apparatus at the Wellingborough relay station of Broadcast Listeners' Services, Ltd., has been replaced by a new 500-W amplifier, and dual programmes are now being radiated.

The Kilmarnock Corporation has given permission to the Ayrshire Wireless Service, Ltd., to establish a relay system.

Ayr Town Council has referred to the Corporation Works Committee for consideration an application by Ayrshire Wireless Services, Ltd., for permission to install a relay service in the borough, and offering to pay to the Corporation 6½ per cent. of the gross takings, equivalent to £250 per 1,000 subscribers.

Malaya.—BROADCASTING ACTIVITIES.—It is understood that the broadcasting company which it is proposed to form in Singapore is still awaiting approval and issue of its licence. In the meantime, says *World Radio*, the technical plans are still being considered and finally formulated, after which, it is to be supposed, the company will go to the public for its funds.

Sweden.—THE TELEPHONE SYSTEM.—On his return to England last week from Sweden, to which country he has been paying a short visit, Sir Kingsley Wood, the Postmaster-General, had a number of interesting things to say about the telephone system there. Sweden, he says, has the telephone habit, and Stockholm is the most highly developed city in the world with regard to the proportion of telephones to the population. Although Great Britain had a record number of new subscribers last year, Sir Kingsley is convinced that the field of operations must be extended. Three services which he considers Great Britain ought to copy are: A "name-call" service by means of which certain subscribers can be called by name instead of numbers; an elaborate system for calling taxis; and an extensive Information Bureau scheme for rendering assistance to subscribers and accepting various commissions for them.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—September 13th. Argentine State Oilfields. Two transporters (electric trucks) with jib crane, specially designed for the transport over cement roads of tubes containing sulphurous anhydride. (G.Y. 12891.)*

Australia.—ADELAIDE.—October 17th. Engineering and Water Supply Department. Four turbo-blowers and three compressors, with motors and starters. (G.Y. 12890.)*

Bognor Regis.—September 4th. Urban District Council. Two 3-in. centrifugal pumps, 5-h.p. electric motors and electric controlling apparatus. Mr. J. Draper, surveyor, Town Hall.

Cheadle & Gatley.—September 15th. Electricity Department. E.h.p. cable. (See this issue.)

Cupar.—September 19th. Fife and Kinross District Asylum. Electrical work, cooking appliances, &c., for central kitchen. Mr. A. D. Haxton, architect, Commercial Road, Leven (deposit £1 1s.).

Dundee.—September 13th. Electricity Department. L.p. cable. (August 25th.)

Egypt.—CAIRO.—September 11th. Controller of Technical, Industrial and Commercial Education. Mechanical and electrical equipment for the Abbassia Technical School. (A.Y. 11879.)*

October 5th. Ministry of the Interior. 1,000 a.c. meters. (A.Y. 11943.)*

October 28th. Three-phase generating set and two batteries of condensers for power factor improvement. (A.Y. 11953.)*

November 14th. Prisons Administration. Machinery, including electric motors, switchboard and cables, for extension of Delta Barrage Spinning Mills. (F.Y. 1841.)*

Irish Free State.—DUBLIN.—September 20th. Corporation. Two automatically controlled electrically driven axial flow pumps (10,000 gal. per minute each). City engineer, Castle Street.

MONAGHAN.—Installation of electric lighting plant at the Monaghan Mental Hospital. Mr. Gallagher, clerk, Mental Hospital.

CORK.—Corporation. Electric lighting of new municipal offices and City Hall. Messrs. McAteer & MacEntee, consulting engineers, 9, Dawson Street, Dublin. (Deposit £10 10s.)

Leyton.—September 4th. Town Council. Lighting and electrical equipment at Public Baths, High Road. (August 18th.)

London.—HOLBORN.—October 3rd. Borough Council. Vehicle-actuated traffic signals in Kingsway and Great Queen Street. Borough engineer and surveyor.

SOUTHWARK.—September 13th. Borough Council. Two 2,000-kW motor convertors, four 1,000-kVA transformers, a.c. and d.c. switchgear. (August 25th.)

BERMONDSEY.—September 16th. Borough Council. Electric cable, equipment, and accessories. (August 25th.)

OFFICE OF WORKS.—September 8th. Cables for Watford Building Research Station. (August 25th.)

New Zealand.—WELLINGTON.—October 24th. Public Works Department. Four 3,333-kVA. 110-kV transformers. (A.Y. 11936.)*

September 19th. Telephone keys and mountings. (A.Y. 11952.)*

Reigate.—September 4th. Town Council. New batteries for two electric refuse-collecting vehicles. Superintendent, Refuse Disposal Works, Earlswood.

Salford.—September 22nd. Electricity Department. 6,600/400-V three-phase oil immersed transformers. (See this issue.)

South Africa.—PRETORIA.—September 22nd. Government Supplies Board. Radio measuring instruments. (A.Y. 11940.)*

CAPETOWN. — September 13th. Electricity Department. Thirty-two three-phase transformers. (A.Y. 11931.)*

JOHANNESBURG.—September 16th. City Council. Ten miles of weatherproof copper conductor. (A.Y. 11947.)*

October 9th. South African Railways and Harbours. Copper contact wire and copper cable. (G.Y. 12901.)

Swansea.—September 4th. Education Committee. Electric lighting installations at the new Junior School at Cockett. Borough architect, 3, Prospect Place.

Turkey.—ANKARA.—September 24th. Administration of Posts, Telegraphs and Telephones. 7,000 metres of submarine telephone and telegraph cable and accessories. (A.Y. 11935.)*

Warrington.—September 4th. Electricity Department. Cables, earthenware conduits, and concrete slabs and tiles. (August 18th.)

September 4th. E.h.p. sub-station switchgear. (August 25th.)

West Riding.—September 14th. Mental Hospital Board. Three months' supply of electric lamps. Mr. G. L. Banner, clerk, Board offices, Wakefield.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Dalbeattie.—Town Council. Accepted. Installing electricity in houses (£107).—J. W. H. B. Morgan.

Darlington.—Town Council. Accepted. Sub-station switchgear.—Ferguson, Pailin, Ltd.; Crompton Parkinson, Ltd. Rewiring of the old lending library and other rooms.—W. Sykes & Co.

Dewsbury.—Housing Committee. Accepted. Wiring eighteen houses at Dawgreen Estates (£79).—W. Angus.

Farnworth.—Electricity Committee. Accepted. 500-kVA transformer (£177).—Electric Construction Co., Ltd. 300-kVA auto-transformer with grade "A" oil (£59).—Metropolitan-Vickers Electrical Co., Ltd. L.p. cable (£1,254).—Edison Swan Cables, Ltd.

Kilmarnock.—Housing Committee. Accepted. Electric lighting at 104 houses at Bonnyton (£680).—W. Findlay Nelson.

Lincolnshire.—Education Committee. Accepted. Electric lighting installation at Cleethorpes Council School (£185).—Hunt & Co.

London.—HOLBORN.—Highways Committee. Accepted. Traffic signals at Chancery Lane (£204).—Revo Electric Co., Ltd.; in Theobalds Road (£542), with seven years' maintenance—Automatic Electric Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Accepted. Switchgear (£14,059).—A. Reyrolle & Co., Ltd.

Southampton.—Electricity Committee. Accepted. Kiosk (£165).—Ferguson, Pailin, Ltd. 300-kVA transformer (£179).—Hackbridge Electric Construction Co., Ltd. Electricity meters. (£970), Aron Electricity Meter, Ltd.; (£5,386), Chamberlain & Hookham, Ltd.; (£1,529), Edison Swan Electric Co., Ltd.; (£230), Electrical Apparatus Co., Ltd.; (£458), Ferranti, Ltd.; (£145), Landis & Gyr, Ltd.; (£3,814), Metropolitan-Vickers Electrical Co., Ltd.; (£150), Smith Meters, Ltd.

Stafford.—Electricity Committee. Accepted. Cables (£2,026).—Callender's Cable & Construction Co., Ltd.

General Purposes Committee. Recommended. "Electromatic" vehicle-actuated traffic signals (£354).—Automatic Electric Co., Ltd.

Stockton-on-Tees.—Town Council. Accepted. Switchgear and kiosk (£511).—Crompton Parkinson, Ltd.

Stonehaven.—County Council. Accepted. Electrical work at the new offices for the Kincardine County Council.—J. Ellis.

Stratford-on-Avon.—Housing Committee. Accepted. Wiring twenty-six Council houses (£125).—Mackay & Co. Wiring twenty-nine houses (£3 each).—M. S. Davis.

Turton.—Electricity Committee. Accepted. Cables.—Edison Swan Cables, Ltd. Cut-outs.—W. T. Henley's Telegraph Works Co., Ltd.

Wallasey.—Electricity Committee. Recommended. Eight 100-kVA single-phase transformers (£430).—Yorkshire Electric Transformer Co., Ltd.

Floodlighting at Leeds

The new Leeds Civic Hall, designed and planned by Mr. E. Vincent Harris, which was described in our last issue, is undoubtedly among the most striking municipal buildings in the North of England. The General Electric Company, Ltd., undertook the floodlighting of the complete front facia and the four sides of each tower, and it was stipulated that the units should be invisible from any approach to the building. The stonework responds beautifully to the brilliant beams of

The effective floodlighting of the new Leeds Civic Hall

twenty-four G.E.C. floodlights with "Osram" lamps, with a total consumption of 22 kW.

To mark the occasion of the King's visit to Leeds to open the new Civic Hall, the beautiful remains of Kirkstall Abbey, near Leeds, were also floodlighted by the G.E.C. Mr. Vane Morland, of the Leeds Corporation Tramways and Transport Dept., was the leading spirit in arranging this, and the effect of modern floodlighting on the gaunt walls of the nave and towers of the historic building fully justified the project. A battery of fifty-six G.E.C. floodlights (44 kW) was installed.

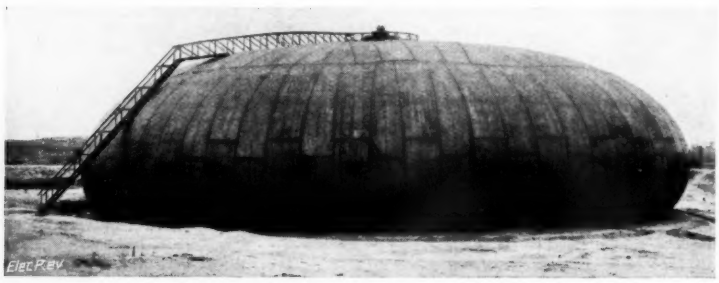
Notes

The Dumfries County Scheme

On page 275 we reproduce a series of photographs relating to the Dumfries county electrification scheme which is the sole example of a county council assuming responsibility for the whole of the electricity supply in its area.

The area for which the Dumfries County Council acquired its Order is about 1,000 sq. miles. Some particulars of the scheme were given in our issue of February 10th (page 192) at the time of its inauguration by Sir Andrew Duncan, chairman of the Central Electricity Board.

A supply is taken from the grid and a network of 11-kV and 33-kV overhead transmission lines, about 300 miles in length, has been erected and practically all of it is now in commission. The burghs and large villages are already receiving a supply, and it is expected that by the end of the year every village in the county, of which there are over seventy, will be connected.



A welded 80,000-barrel oil storage tank

So far as this portion of the scheme is concerned, the development is on orthodox lines and possibly only noteworthy by reason of its magnitude. Mr. J. S. Pickles, the county electrical engineer, informs us, however, that a further and important feature of the scheme is the definite attempt to give supplies to all farms and other isolated premises in the rural area. These supplies are being offered on exceptionally good terms, and it is anticipated that over 300 farms will be connected during next year, practically all of them involving separate tappings of the h.p. main.

Ships' Cooking and Heating Equipment

According to the Danish Foreign Office *Journal*, the Rotterdamsche Lloyd motor ships *Baloeran* and *Dempo* have recently been equipped with "Vesta" electrical cooking and heating apparatus. In each ship there is an 80-kW cooking range for the passenger galley and a 50-kW outfit for the crew's galley. Each ship's installation will serve about 1,800 persons, and will be handled by fourteen cooks. The equipment includes the necessary hot-closets and three 150-litre vegetable boilers. These ships are also equipped with 626 cast-iron stoves, and about 3,000 heaters supplied to the s.s. *Statendam*. Illustrations appear on page 285.

Radio While You Drive

The Hillman Motor Car Co. is to equip all its new season's "Minx" saloons with an aerial built into the roof in order that a radio receiver may easily be fitted.

The E.P.E.A. Dinner

The fifteenth annual dinner given by the Southern Division of the Electrical Power Engineers' Association to the members of the National Executive Council will be held in the King's Hall, Holborn, on Saturday, September 30th. The dinner will be followed by a dance. Double tickets for members at 8s. 6d. and tickets for non-members at 10s. 6d. may be obtained from Mr. F. H. Smethurst, "Tremorvah," Lynton Road South, Gravesend. As the demand for tickets is heavier than ever, early application is desirable.

A New Pyrometric Material

In a recent issue of the *Power Engineer* some particulars are given of a new thermocouple employing "Pyrofer" and nichrome. "Pyrofer," as the negative, is claimed to be more resistant to oxidation and corrosion than the best materials previously used for positives. A thermocouple of this type immersed without protection in a lead bath at 1,350-1,400 deg. C. showed no distress after several hours, while the best of other types broke down in less than a minute under similar conditions. The e.m.f. produced is about 20 mV at 800 deg. C. Indicators and recorders as constructed by the Bowen Instrument Co., Ltd., who have introduced the thermocouple, have sensitivities ranging from 9 to 15 ohms per mV, so that a pyrometer of range 0-800 deg. C. would have a circuit resistance between 200 and 300 ohms, which is amply sufficient to swamp out incidental errors of temperature co-efficient, cable resistance and the like. When used in the usual forms of furnaces the new thermocouples are guaranteed for twelve months up to 1,000 deg. C., and with further experience it is hoped to extend the guarantee to 1,200 deg. C. Thus considerable economy is obtainable; moreover, sheaths may in many cases be eliminated, thus further reducing costs and also lowering the time lag. Temperatures as high as 1,450 deg. C. have been registered without harm to the thermocouple, while pyrometers employing "Pyrofer" may be employed for up to 1,000 deg. C. and be calibrated to read 200 deg. C. across the scale, say, 500 deg. C. to 700 deg. C., instead of commencing from Zero as with thermocouples.

Welded Spheroid Tanks

The Chicago Bridge and Iron Works, Chicago, U.S.A., has constructed two 80,000-barrel oil storage tanks. One of these spheroidal "Hortonspheroids" is shown in the accompanying picture. In their construction less material was required than for cylindrical tanks and also, because the stresses in a spheroid (due to double or compound curvature) are less than in a cylinder, lighter steel plate was used.

The flat bottom of $\frac{1}{4}$ in. thick steel plate rests upon a graded earth base and supports interior columns which carry the roof. Truss frames are used to reinforce the sides. The shell itself is $\frac{3}{16}$ in. thick, while the roof includes $\frac{3}{16}$ in. to $\frac{5}{16}$ in. steel plate. All joints were lap welded by the shielded arc process, using "Stable Arc" welders and electrodes manufactured by the Lincoln Electric Company, Cleveland, Ohio, U.S.A. The two tanks were completely welded in the field with no preliminary shop fabrication. Each tank is 136 ft. in diameter and 40 ft. high. An interesting fact pertaining to the design of spheroids is that if the tanks were increased to 1,000,000 or 10,000,000 barrels capacity, the height would remain constant. Only the diameter would be increased to accommodate the larger volume.

Educational

Evening classes in all branches of engineering will commence on September 25th at the Northampton Polytechnic Institute, St. John Street, London, E.C.1.

(See our classified advertisements.)

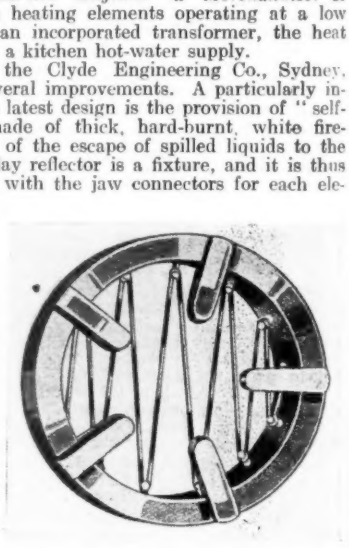
A French Electrical Congress

The tenth annual Low-Tension Congress of the Syndicat Général des Installateurs-Electriciens Français is to be held in Paris from October 5th to 8th.

A Low-voltage Cooker

The "Compleat" electric cooking range, which was described in the *Electrical Engineer & Merchandiser* of Australia recently, has heating elements operating at a low voltage supplied from an incorporated transformer, the heat losses of which provide a kitchen hot-water supply.

The manufacturers, the Clyde Engineering Co., Sydney, have recently made several improvements. A particularly interesting feature of the latest design is the provision of "self-cleaning" reflectors made of thick, hard-burnt, white fire-clay, shaped to permit of the escape of spilled liquids to the tray below. The fire-clay reflector is a fixture, and it is thus practicable to dispense with the jaw connectors for each element. Any spilled food that carbonises on reflectors of this material reduces to fine ash, and automatically disappears after a short interval of heating of the elements. This property, however, is only of real value with the low-voltage elements used in the "Compleat" range, since, at the standard pressures of 230-240V, the elements would be easily short-circuited or earthed with the carbonisation of such spilled foods.



One of the boiling rings of the "Compleat" cooker

Arrangements have also been made for the removal of the contact covers on the surface of the cooking table, thus permitting the users to clean completely round the element with a single sweep of a towel. The former spirally wound hot-table element has also been replaced in the new design by a zig-zag type of nichrome wire construction, supported by insulated nichrome hooks, and the element is now more robust. The speed of heating of the 1,700-W element (which can now be supplied within a diameter of 6 in.) is very high. The idea of transformer heat losses being used for water heating recalls the days when almost every house had its own transformer; and yet little attempt was made at that time to use the lost heat in what would have been a profitable way.

Makers' Names Wanted

GRIPFAST lead wall plug.
EASYWASH electric washing machine.
ROWENTA electric hot water jug.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. Newey, who has been appointed electrical engineer to the Lincoln Corporation, was presented with a barometer by the members of the Long Eaton Urban District Council, and an electric clock by the staff of the Electricity Department at a farewell smoking concert held on August 24th. In making the presentation on behalf of the Council, Mr. T. W. Smith said that when Mr. Newey went to Long Eaton eleven years ago there was an overdraft of £13,000 against the undertaking, but under his management not only had the undertaking wiped off that overdraft, but it had been able to place £8,000 to reserve. Mr. W. Horne presented the gift from the staff. Among those present was **Mr. J. B. Feltham,** who succeeds Mr. Newey at Long Eaton.

Mr. A. Renwick, who for the past twelve years has been secretary of the Ashton-under-Lyne Electricity Employés' Association, has retired from that office, and has been presented by his colleagues with a smoking set and a writing set.

Mr. B. Windle, of Nelson (late director of Messrs. Windle, Ltd., electrical factors), has been appointed manager of the electric cable and wire section of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd. He will reside in London.

Mr. Samuel Insull has been taken into preventive detention at Athens, according to a *Reuter* message. A formal request has been presented to the Greek Government for his extradition, based on a new indictment charging him with violation of the bankruptcy laws. The Federal District Attorney in Chicago has disclosed that the new indictment preferred against Mr. Insull and ten other persons charges them with transferring property in anticipation of bankruptcy. Mr. Insull is now in a nursing home, his doctors having recommended that he should be kept under observation.

A later message says that the Athens Appeal Court has formally approved a warrant issued by the Public Prosecutor for Mr. Insull's arrest. Mr. Samuel Insull, Junior, has also been charged with breaches of the bankruptcy laws, and has provided $10,000 security as a guarantee of his appearance to answer the charges.

The *Electrical World* states that suits to recover $37 million from the officers and directors of the Corporation Securities Co. (an Insull concern) have been authorised by Mr. Garfield Charles, referee in bankruptcy.

Mr. F. Goble has resigned his position with the Times Electric Co., Ltd., London, E.C.

Mr. T. Beddard and **Miss R. Normanton,** members of the staff of Messrs. Oldham & Sons, Ltd., Denton, Manchester, who were recently married, have been presented by their colleagues with a dining table, four chairs, an oak clock, and a cut-glass salad bowl.

Mr. B. B. Blackburn is retiring from active direction of the London business of Messrs. Best & Lloyd, Ltd. After more than twenty years' activity as the managing director of the company at its Birmingham Works, Mr. Blackburn transferred his residence to London two years ago.

Though not a Birmingham man, Mr. Blackburn has spent most of his life in that city, and has been connected with the lighting fittings trade for forty-three years, the last thirty of them being with his present company, of which he remains a director. For several years he was president of the British Brassfounders Employers' Association, and he was prominent in other work unconnected specifically with his trade, such as the British Industries Fair, he having been a member

[*Reg. Haines.*

Mr. B. B. Blackburn **Mr. S. A. Coleman**

of the original Council. He was vice-president of the Industrial League Council before its amalgamation with the National Alliance of Employers and Employed. He is an authority on the subjects of welfare work in factories and joint works committees.

Mr. S. A. Coleman, manager of sales and showrooms of the Sun Electrical Co., Ltd., will take charge of Messrs. Best & Lloyd's London office and showrooms, commencing his duties on September 4th.

Mr. C. G. Maisey, who has represented Walsall Conduits, Ltd., West Bromwich, as their London manager for the past twenty years, has been elected to the board of directors.

[*Wakefields.*

Mr. C. G. Maisey

Mr. J. H. Holmes, who is well known for his connection with the founding of the original firm of Messrs. J. H. Holmes & Co., fifty years ago, recently visited the works of Messrs. A. Reyrolle & Co., Ltd., particularly to see the activities of Messrs. J. H. Holmes & Co., Ltd., the successors of his earlier firm, in their modern surroundings at Hebburn-on-Tyne. Messrs. Holmes, as is generally known in the industry, have been associated with Reyrolle's since 1928, and have been at Hebburn since 1930. After seeing the works, Mr. Holmes lunched with directors of Messrs. Reyrolle and members of the staff, including some either now or formerly associated directly with the Holmes Company, and in responding to the welcome given to him he recalled some of his early experiences in the days of initiation and pioneering half a century ago.

Dr. H. Webster has been appointed radio research lecturer and expert to the Australian Radio Research Board. Dr. Webster was born in Tasmania, and graduated at the university of that State and at the Melbourne University. Later he came to England and studied at the Cavendish Laboratory, Cambridge, under Lord Rutherford and Dr. Chadwick, receiving the degree of doctor of philosophy. He left Cambridge to become assistant lecturer in physics under Dr. Tyndall at Bristol University, where he has been for the past two years.

Mr. J. A. C. Allom, chairman of the Auckland Transport Board, is leaving New Zealand for England shortly, according to a *Reuter* message from Auckland (N.Z.). The object of his visit is to discuss with holders of Auckland Transport Board bonds the question of future interest payments, following the decision to pay the July instalment in sterling without prejudice pending the conference.

Mr. H. C. Loving, who has held successively the positions of chief engineer at Sheffield to Messrs. Cammell Laird & Co., Ltd., and to the English Steel Corporation, Ltd., has been appointed chief engineer to the Tata Iron & Steel Co., Ltd.

Mr. W. S. Lawlor, M.A., has been appointed assistant secretary to the Electricity Supply Board of the Irish Free State, in whose service he has been since 1928.

Mr. R. H. Poole, a member of the staff of the English Electric Co., Ltd., Stafford, was married at St. Thomas's Church, Walton, on August 18th, to Miss Grace Wright.

The many friends of **Mr. Howard Foulds,** secretary of Callender's Cable & Construction Co., Ltd., will join with us in an expression of deep sympathy with him in the death of his youngest son, John Howard Foulds, aged twenty years, which occurred in a motor-cycle accident near Stafford last Saturday.

Obituary

Mr. W. Thompson.—*The Times* reports that Mr. William Thompson (30), of Inverness, engineer in charge of part of the construction work at Roughburn Dam, Tulloch, Inverness-shire, on the Grampian hydro-electric scheme, was crossing a temporary bridge with a party of workmen when he slipped, fell into the torrent below, and was drowned.

Mr. W. J. Dixon.—The death is announced, at the age of fifty-two, of Mr. W. J. Dixon, technical engineer at the Beam Wireless Station, Terre Haute, Dorchester. He had been there for four years, having been transferred from London.

Mr. C. Bolton.—The death took place on August 17th, at the age of seventy-five, of Mr. Cornelius Bolton, of 2, Part Street, Southport, where he had been in business for thirty-five years as a dealer in electrical goods.

Mr. P. Gregson.—Mr. Paul Gregson, who was well known in South African electrical engineering and sporting circles, recently died at his residence at Johannesburg. Mr. Gregson, who was fifty-five years of age, was born in Manchester. He was educated at King William's College, Isle of Man, after which he studied electrical engineering with the English Electric Co. He went to South Africa just before the South African War, and served with the Imperial forces. For some years he was an electrician at several gold mines, and then

commenced business on his own account. Mr. Gregson helped to found the South African Institute of Electrical Engineers, of which he was president in 1928. He took a great interest in sport, including Rugby football, boxing, and swimming. He leaves a widow and two sons.

Sir Philip Magnus.—The death occurred on Tuesday, at Chilworth, Surrey, of Sir Philip Magnus, Bt. He was ninety years of age, and throughout the whole of his career he had devoted himself to educational causes—particularly technical education. In 1880 he was the first secretary of the City and Guilds of London Institute. It was largely due to Sir Philip's influence that the University of London, when it was reconstituted in 1899, included a Faculty of Engineering. He was also closely identified with the establishment of the Finsbury and South Kensington Technical Colleges.

Major R. Mitchell.—Major Robert Mitchell, C.B.E., vice-president of the Regent Street Polytechnic, died on Sunday last at his home at Regent's Park at the age of seventy-eight years. For more than sixty years he devoted himself to the establishment, secretaryship, and educational work of the Institute. He gave very full service on many committees and in many organisations during and following the war. In 1919 he was chairman of the Association of Technical Institutions.

Mr. R. A. Poole, managing director of Messrs. R. A. Poole (London), Ltd., Shepherd's Bush, died on Tuesday last week, at his residence at Ealing, after a very short illness contracted while on holiday in Norway. He was fifty years of age. The funeral took place at Ealing, on Saturday.

Mr. W. F. Arnold.—The death occurred on August 22nd of Mr. W. F. Arnold, showroom manager for the General Electric Co., Ltd., at Magnet House, Kingsway, W.C. Mr. Arnold, who was fifty-seven years of age, was on holiday in the Isle of Wight and collapsed whilst bathing. He joined the company in 1894, in its counting house, and had thus completed thirty-nine years of service. He was subsequently transferred to the fittings department at 88, Queen Victoria Street, E.C., and was appointed showroom manager in 1903, which position he held until his death, except for a short period in the outside sales department from 1923 to 1927. Mr. Arnold acquired a wide knowledge of period decoration, and was an authority on all the changing developments in modern decorative fittings. The funeral took place on August 25th at Gerrard's Cross.

The late Mr. W. F. Arnold

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

British Short-Circuit Testing Station, Ltd.—Private company. Registered August 25th. Capital, £10,000 in £1 shares. Objects: To carry on the business of an electrical testing station, to carry out short-circuit and other tests on switchgear, reactances and electrical plant and apparatus of all kinds; to carry out and issue certificates in respect of tests of all kinds on every kind of electrical plant and apparatus, &c. The subscribers are: G. Morpeth and N. Booth, both of Pilgrim House, Newcastle-upon-Tyne. Registered office: Pilgrim House, Newcastle-upon-Tyne, 1.

Neons (London), Ltd.—Private company. Registered August 21st. Capital, £525 in 500 6 per cent. preference shares of £1 and 500 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers or manufacturers' agents for products connected with neon gas, &c. The directors are: H. J. Kennedy, 26, Dennis Park Crescent, W. Wimbledon, S.W.20; I. Vane-Roper, 67, Shirland Road, W.9, and Matilda Poole, 23, Witherington Road, Highbury, N.5. Registered office: Audrey House, Ely Place, E.C.1.

Radio Rentals, Ltd.—Private company. Registered August 19th. Capital, £11,000 in 9,000 preference shares of £1 each and 10,000 ordinary shares of 4s. each. Objects: To carry on the business of radio engineers, manufacturers and hirers of and dealers in radio apparatus, gramophones, &c. The directors are: Dr. M. W. Chill, "Windicroft," De Courcel Road, Brighton; P. Perring-Thomas, 25, High Street, W., and G. F. Coleman, Hove. Solicitors: Coleman & Co., Hove.

Rival Lamps, Ltd.—Private company. Registered August 9th. Capital, £10,000 in 8,000 ordinary shares of £1 and 200 participating ordinary shares of £10 each. Objects: To carry on the business of manufacturers of and dealers in electric incandescent lamps, wireless valves, neon lights, natrium lights, signalling devices, &c. The directors are: A. J. Harrison, The Ferns, St. Bernards Road, Olton, Warwickshire; R. G. Boardman, Oak Tree House, Prospect Road, Moseley, Birmingham; A. E. Phillips, 137, Salisbury Road, Moseley, Birmingham; H. T. Phillips, 205, Bristol Road, Edgbaston, Birmingham; J. F. H. C. E. Engelen, 5, Bedford Place, W.C.1. Registered office: 230/232, Knight's Hill, S.E.27.

Marlborough Electrical Co., Ltd.—Private company. Registered August 23rd. Capital, £500 in £1 shares. Objects: To carry on the business of electrical and general engineers, manufacturers of and dealers in electricity, &c. The directors are: C. Pelling, Beckley Cottage, Great Bookham, Surrey, and W. E. Rawson-Bottom, Westdean, William Road, Guildford. Registered office: 52, Great Marlborough Street, W.1.

Violite (1933), Ltd.—Private company. Registered August 23rd. Capital, £100 in 1s. shares. Objects: To carry on business as designers, manufacturers and suppliers of, agents for, and dealers in electrical signs and all electrical goods, apparatus and equipment, electric lamps and lighting equipment, X-ray and scientific apparatus, wireless equipment and accessories. The directors are: J. Metcalfe, 11, Basing Hill, Golders Green, N.W.; J. Diamond, "Lydden," King Edward's Road, Ruislip. Secretary: J. Diamond. Registered office: 41, Great Windmill Street, W.1.

Bolton Electrical Traders, Ltd.—Private company. Registered August 24th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in vacuum cleaners, &c. The first director is Robert E. Morley, 14, Loxham Street, Bolton, engineer.

Barlow & Young, Ltd.—Private company. Registered August 24. Capital, £500 in £1 shares. Objects: To acquire the business of an electric, consulting and general engineer carried on by S. L. M. Barlow, at 19-21, Palace Street, Westminster, as "Barlow & Young." The subscribers are: L. Barlow, M.I.E.E., 12, Higher Drive, Banstead, Surrey, consulting engineer; S. Montague Barlow, 47, Woodbridge Drive, Sutton, Surrey, electrical engineer; S. L. Montague Barlow, of 19-21, Palace Street, S.W.1, is permanent managing director.

G. A. Brittain (Radio), Ltd.—Private company. Registered in Dublin on August 22nd. Capital, £100 in £1 shares. Objects: To carry on the businesses of manufacturers of and dealers in wireless instruments, loud speakers, valves and accessories, telegraph, television and telephone apparatus, instruments and supplies, electrical fittings, &c. The subscribers are: David L. J. Babington, 7, Neville Road, Rathgar, Dublin; J. Bell, 11, Lower Ormond Quay, Dublin. The first directors are: George A. Brittain and Alice Louise Brittain, addresses not stated.

Homeaids Ambilectric Radio, Ltd.—Private company. Registered August 25th. Capital, £500 in 10s. shares. Objects: To carry on the business of manufacturers and importers of and dealers in radio and electrical apparatus of all kinds, &c. The permanent directors are: Mrs. I. G. Fincham and S. E. Fincham, both of 107, Upper Tulse Hill, S.W.2; and A. G. Hooker, address not stated. Registered office 56, Victoria Street, S.W.1.

Radio Recordagrams, Ltd.—Private company. Registered August 25th. Capital, £100 in £1 shares. Objects To carry on the business of manufacturers of and dealers in wireless and gramophone goods, workers and dealers in electricity, &c. The permanent directors are E. P. Rigby, 3b, Sloane Square, S.W.1, and two others. Registered office: 3/5, Burlington Gardens, W.1.

Portland Radio Co., Ltd.—Private company. Registered August 24th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless instruments, &c. The subscribers are: H. Everett, 116, Court Lane, S.E.21, and H. V. Maior, 1, The Carfax, Sydenham Park Road, S.E.26. Registered office 222, Great Portland Street, W.1.

Returns of Electrical Companies

Elliott's Electrical Construction Co., Ltd.—Capital, £1,000 in £1 shares. Return dated September 3rd, 1932 (filed May 12th, 1933). 825 shares taken up. £825 considered as paid. Mortgages and charges, nil.

British Insulated Cables, Ltd.—Capital, £2,666,666 in 500,000 "A" 5½ per cent. preference, 500,000 6 per cent. preference, and 1,666,666 ordinary shares of £1. Return dated April 11th, 1933. All shares taken up. £2,239,341 paid on 500,000 "A" preference, 372,350 6 per cent. preference, and 1,366,991 ordinary shares. £427,325 considered as paid on 127,650 6 per cent. preference and 299,675 ordinary shares. Mortgages and charges: £700,000.

West Cornwall Electricity Supply Co., Ltd.—Capital, £100,000 in £1 shares. Return dated May 18th, 1933. 100,000 shares taken up. £37,504 7s. 6d. paid (£1 on 7 and 7s. 6d. on 99,993). Mortgages and charges, nil.

British Electrical Maintenance & Insurance Co., Ltd.—Capital, £1,000 in £1 shares. Return dated August 28th, 1932 (filed April 21st, 1933). 999 shares taken up. £999 paid. Mortgages and charges, nil.

Keswick Electric Light Co., Ltd.—Capital, £20,000 in £1 shares (5,000 preference and 15,000 ordinary). Return dated April 13th, 1933. 4,000 preference and 15,000 ordinary shares taken up. £13,000 paid on 13,000 ordinary, £6,000 considered as paid on 4,000 preference and 2,000 ordinary shares. Mortgages and charges, nil.

Wakelin's Wireless Co., Ltd.—Capital, £2,500 in 1,250 preference and 1,250 ordinary shares of £1. Return dated December 1st, 1932 (filed May 4th, 1933). 135 ordinary shares taken up. £102 paid. £33 considered as paid. Mortgages and charges: £644 11s. 8d.

Austin Walters & Son, Ltd.—Capital, £3,000 in £1 shares. Return dated May 26th, 1933. 1,802 shares taken up. £802 paid, £1,000 considered as paid. Mortgages and charges, nil.

Baily Grundy & Barrett, Ltd.—Satisfaction in full on July 25th, 1933, of debenture dated December 7th, 1920, and registered December 9th, 1920, securing all moneys due or to become due from the company to Lloyds Bank, Ltd.

Supra Electra Motors, Ltd.—Issue on August 18th, of £200 debentures, part of a series already registered.

John Bennie, Ltd.—Mortgage, dated August 8th, to secure £1,200, charged on a certain contract and all moneys payable thereunder. Holders: Brush Electrical Engineering Co., Ltd., Loughborough.

Wholesale Electrical Supplies (Salford), Ltd.—Particulars filed of debentures, not exceeding £2,500, authorised July 28th, 1933, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £2,500.

Boothroyd Electrical Co., Ltd.—Debenture, dated August 19th, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Miss P. M. Roscoe, Rowlands Court, Lingfield, Surrey.

Wilrose Company (Birmingham), Ltd.—First mortgage debenture, dated August 11th, 1933, to secure £2,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: I. Rosenthal, 12, Rotton Park Road, Edgbaston, Birmingham.

Keighley Fan & Motor Co., Ltd.—Mortgage on land and the Myrtle Engineering Works, Barcroft Cross Roads, Keighley, dated August 16th, to secure balance of an account current between the company and the Keighley and Craven Building Society.

Norwich Wireless Co., Ltd.—Capital, £1,000 in £1 shares. Return dated August 31st, 1932 (filed March 24th, 1933). 794 shares taken up. £794 paid. Mortgages and charges: £800.

Eltron (London), Ltd.—Capital, £1,000 in 750 "A" and 250 "B" shares of £1 each. Return dated December 31st, 1932 (filed June 10th, 1933). 750 "A" shares taken up. £210 paid, £540 calls unpaid. Mortgages and charges, nil.

British Power Railway Signal Co., Ltd.—Satisfaction to the extent of £4,000, on December 31st, 1919, of debentures authorised November 18th, 1915, and registered March 9th, 1916. Notice filed August 16th, 1933. (According to the register of mortgages, the debentures registered March 9th, 1916, originally secured £10,000.)

British Ipso Battery Co., Ltd.—G. Gain, 53, New Broad Street, E.C.2, was appointed receiver on August 18th, 1933, under powers contained in debenture dated March 14th, 1933.

Lustrolux, Ltd.—Capital £25,000 in £1 shares. Return dated December 30th, 1932 (filed May 11th, 1933). 9,002 shares taken up. £9,002 paid. Mortgages and charges, £452 10s.

Fort Radio, Ltd.—Debenture dated August 18th, 1933, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. E. E. Langbart, 407, Lordship Lane, Tottenham, N.17.

Mid-Cheshire Electricity Supply Co., Ltd.—Capital, £225,000 in 10,000 5 per cent. cumulative preference, 60,525 7 per cent. cumulative preference, 149,791 ordinary, and 4,684 unclassified shares of £1. Return dated April 14th, 1933. All the preference and ordinary shares taken up. £219,099 7s. 6d. paid. £816 considered as paid. £400 12s. 6d. calls unpaid. Mortgages and charges, nil.

Notting Hill Electric Lighting Co., Ltd.—Capital, £335,250 in 20,000 6 per cent. cumulative preference shares of £10 and 135,250 ordinary shares of £1. Return dated April 21st, 1933. All shares taken up. £201,352 10s. paid (£10 per share on the preference and 1s. per share on 27,050 ordinary). £133,897 10s. considered as paid (£1 per share on 108,200 ordinary shares and 19s. per share on 27,050 ordinary shares). Mortgages and charges, £147,050.

Edwd. Deane & Beal, Ltd.—Capital, £60,000 in 20,000 preference and 40,000 ordinary shares of £1. Return dated November 11th, 1932 (filed April 11th, 1933). 20,000 preference and 20,009 ordinary shares taken up. £9 paid. £40,000 considered as paid. Mortgages and charges, £5,000.

British General Radio Co. (Retail), Ltd.—Capital, £200 in 1s. shares. Return dated September 14th, 1932 (filed May 8th, 1933). 4,000 shares taken up. £165 paid on 3,300. £35 considered as paid on 35. Mortgages and charges, nil.

City Notes

Enfield Rolling Mills, Ltd.—In an official statement of this company, its operations, its finances, and its future, published in the newspaper Press in compliance with the regulations of the committee of the Stock Exchange, it is shown that during the next twelve months additional working capital to meet expansion in business will be required. Arrangements have been made for this money to be provided by means of advances from some of the larger shareholders. The company was formed in 1924 as a private concern to manufacture and supply its shareholders, the chief one being the Enfield Cable Works, Ltd., with copper rod, and a plant was laid down in England for the purpose. The company's operations were soon extended to the manufacture of sectional copper, copper strip, &c. Recently, "owing to economic difficulties on the Continent," the opportunity arose to acquire the services of a number of specialists in the refining of metals and the production of high-class alloys and materials, many of which have not hitherto been manufactured here. Considerable extension of the works at Brimsdown was undertaken so that these manufactures might be produced, and within three months the company will be able to supply special high quality metal sheets and apparatus for use in many industries. Last November the business was converted into a public company and the authorised capital was increased from £50,000 to £500,000 in £1 ordinary shares, and bonus and other shares were issued to the tune of £225,000. The gross profit on trading for 1932 was £21,064. The dividends have been 10 per cent. per annum for 1930, 1931, and 1932. The directors are: The Earl of Verulam; Sir Geo. Sutton, Bt. (Henley's); Gen. Sir H. Gough (Siemens Bros.); Mr. G. J. Andrews (Helensburgh); Mr. A. Boerner, metallurgist, Upper Silesia; Mr. F. A. Klare, Sydenham; and Mr. F. Plutte, managing director of Enfield Cable Works, Ltd. The offices of the company are at 296-302, High Holborn, W.C.1.

The Associated Gas & Electric Corporation and its subsidiaries show a total operating revenue of $82,000,289 for the year ended June 30th last (against $88,408,683 in 1931-32); of this $64,393,507 (against $68,327,157) came from its electrical activities. Expenses and taxes absorbed $46,199,497, and provision for renewals, &c., $6,887,867, leaving an operating income of $28,912,924. Other income added gave a total of $30,699,999, from which were deducted fixed charges amounting to $15,654,856, leaving a net balance of $15,045,143. After meeting interest on 8 per cent. eight-year gold bonds $797,515, and on unfunded debt $1,588, $14,247,628 remained for taxes and dividend.

Itonia, Ltd., reports a loss of £4,353 for the year ended March 31st last, as against a deficit of £8,525 in the preceding year. To this is added the deficiency brought forward of £17,388, making a total debit of £21,741, which is carried forward.

Pinchin, Johnson & Co., Ltd., have announced an interim dividend of 6 per cent., less tax, on the ordinary shares (against 7½ per cent.). The directors state that the sales for the six months ended June 30th last show a substantial increase both in tonnage and total money value, while net trading profits show a satisfactory increase.

The "Underground" Group.—Under the London Passenger Transport Act, 1933, the dividends payable by the Underground Electric Railways group for the period to June 30th last are dependent upon the sums certified by an auditor approved by the Minister of Transport as representing the undistributed earnings of the respective companies for the 2½ years from January 1st, 1931, to June 30th, 1933. Messrs. Thomson, McLintock & Co. are the approved auditors for this purpose, and the balances of the undistributed earnings for the above period as certified by them will permit of distributions being made at the following rates:—Metropolitan District, 1.89234 per cent.; London Electric, 1.89234 per cent.; City and South London, 1.89234 per cent.; Central London—undivided ordinary 1.89234 per cent., preferred ordinary 2 per cent., deferred ordinary 1.78468 per cent.

The Lancashire Electric Light & Power Co., Ltd., has announced an interim dividend of 2½ per cent. (same).

The Canadian General Electric Co. has declared a dividend of 75 cents on the common stock for the quarter ending September 30th (against $1), being at the rate of 6 per cent. per annum. The dividend will be paid less 5 per cent. Canadian dividend tax. United Kingdom income-tax will also be deducted from the gross amount of the dividend.

The Southland Electric Power Board recently announced its intention to pay the interest on a loan raised in London in New Zealand currency. This would have meant a decrease of 20 per cent. in payments to London bondholders and an immediate protest was made to the New Zealand Government. Mr. Coates, the Dominion Finance Minister, thereupon conferred with representatives of the Board, and it was later announced that the New Zealand Government would see that British bondholders received their interest at sterling rates whatever the Board might decide to do.

Stocks and Shares

TUESDAY EVENING.

IT is a long time since the Stock Exchange has experienced an August as active, from the business point of view, as the one which will be finished by the time these paragraphs appear. Investment stocks and shares have retreated into the background, the previous interest in them having been displaced by the excitement engendered over gold-mining shares, and—*mirabile dictu*—Home Railways. The holiday season has interfered but little with the accumulating increase of day-to-day business which the Stock Exchange has been called upon to handle. An extraordinary rise in the price of gold, the metal, and a fairly general advance in the quotations for commodities inspired by President Roosevelt's policy are outstanding features. The factors acting and reacting upon one another have led to a dullish tendency for purely investment securities, but have stimulated improvement in the more speculative varieties. Meanwhile, increases in Home Railway traffics and indications of trade revival received from various avenues of industrial work encourage the idea that business is definitely on the mend, and that the coming autumn and winter season can be faced with pleasurable anticipation rather than fear.

London Transport Stocks

In the rush that has occurred to buy gold-mining shares, the gilt-edged stocks have not been passed by, though they would have been better off had no notice been taken of them. Because what is happening now is that people are selling their fixed-interest securities in order to buy speculative stocks and shares. This disposition affects the ordinary stocks of the Home Railway companies, such as London, Midland & Scottish, London & North-Eastern, and similar issues, upon the prices of which the buying has an encouraging effect, though, on the other hand, the purely gilt-edged stocks are subject to realisations by holders who want the money for more

speculative purposes. London Passenger Transport stocks have been, however, rather inclined to harden. The "C" stock is better at 81¼, showing a point gain, this being due to hopeful dividend anticipations. In this article we have endeavoured to keep to the cautious side in the matter of dividend estimates for this stock, though mentioning that the optimistic view expects 5 per cent. during the first year of the stock's existence, whereas the cautious mind considers 3½ per cent. a very fair dividend. The Board's "A" and "B" stocks are both a little harder, in spite of the trend in gilt-edged securities as a whole. London & Suburban Traction preference still remain in the list of officially quoted stocks and shares, the price being 20s.

Cables and Wireless

Apart from a 10s. decline to 30 in the "A" ordinary, Cables & Wireless stocks are without movement. Their claims to consideration have been overshadowed by those in other markets. American Telephone & Telegraph dipped to 139, but rallied to 142½. International "Tel-and-Tel." are 1½ points up at 19. Globe ordinary and preference show declines of 2s. 6d. each.

"Underground" Distributions

The Underground Electric Railways Co. of London has officially announced that although no dividend will be paid in respect of the half-year ended June 30th last, any revenue from the subsidiary companies will be distributed as capital in the liquidation of the company. This distribution will be of modest amount, the London General Omnibus stockholders receiving 59s. per cent. free of tax, and the amount will be about 38s. per cent. less tax in the case of the other companies.

British Electric Traction deferred stock has risen 35, to 475, in consequence of the appreciation in the prices of some of the company's holdings. Associated Equipments have recovered to 35s. 3d. There is still no official Stock Exchange permission to deal in the shares.

Electricity Supply

Lancashire Electric Light & Power ordinary shares are 1/8 better at 35s., and Scottish Power at 38s. 3d. show a gain of 9d. Electrical Distribution of Yorkshire at 46s. 3d. are 6d. to the good, and Yorkshire Electrics are 9d. up at 44s. 6d. The companies are declaring their interim dividends. That on North Eastern Electric ordinary is 2½ per cent., a similar rate to that of a year ago, when a smaller capital ranked for dividend. The Lancashire Electric interim dividend also is 2½ per cent., the same as before. Bournemouth & Poole shares retain their rise at 76s. 3d. No changes have occurred in the list of London electric supply shares, the majority of which stand upon the common platform of 33s.

Electric Supply Corporation shares have risen a florin to 74s. 6d. North Metropolitans are a shade harder at 58s. 6d. Southern Areas remain at 27s., and West Gloucestershire ordinary at 64. On Tuesday, in this week, Edmundson's advanced to 34s. 6d., being 1/8 harder on the day. Atlas are a little better at 9s. 3d. Electrical Finance & Securities are again better at 3¼.

Southland Electric Power

Something like a storm in a teacup was aroused by the announcement of the Southland Electric Power Board, a New Zealand authority, that the interest on the Southland Electric stocks would be paid in future in New Zealand currency. Protest immediately arose, because these payments have been made hitherto in sterling, and holders of the bonds assumed, as a matter of course, that this was the proper medium in which the interest should be distributed. The principal and interest of the bonds are conditionally guaranteed by the New Zealand Government. Accordingly, the New Zealand Minister of Finance was approached, and, as a result of conferences, it is understood that the New Zealand Government will see that British bondholders are paid in sterling, whatever may be the decision of the Power Board. During the period of uncertainty, the Stock Exchange jobbers stopped dealing in the debenture stock of the Southland Electric Power Board, and removed from the pages of the Stock Exchange Official List the quotations for these issues.

Manufacturing and Equipment

British Insulated ordinary are 1/8 harder at 3 7/8. Apart from this decline, the group of manufacturing shares remains very firm. Enfields are better at 4⅛. Ferranti preference rose 9d. to 25s. 9d. The interest which is being taken in mining shares and in Home Railway stocks robs the industrial market of a good deal of attention that until just lately it has received. The iron and steel market continues to go ahead, in consequence of the more satisfactory trade reports, reflected, as these are, in the Home Railway companies' traffics. Vickers have been a good market at 8s. 6d., Babcock & Wilcox rose to 38s. 3d. Other iron and steel shares advanced in greater or less measure. Rubber shares have scarcely moved. In spite of the expectation that commodities will go ahead in America if the present movement in the dollar persists, rubber and rubber shares are neglected. The amount of business doing in the shares has dwindled to a minimum. Victoria Falls ordinary keep strong at 4⅞, on the activity in South Africans.

The dollar stocks are irregular. Brazilian Tractions hardened to 15⅛. Shawinigan's quarterly figures are considered satisfactory: the shares are firmer at 20½.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, Aug. 29.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	76/3	—	3 18 9
Brompton Ordinary	1	8½	7	33/-	—	4 4 10
Charing Cross Ordinary	1	8½	7	33/-	—	4 4 10
Chelsea	1	8⅞	7	32/6	—	4 6 2
City of London	1	10	10	33/9	—	4 3 0
Clyde Valley	1	7	7	37/6	—	3 14 8
County of London	1	10½	10½	53/9	—	3 18 1
Edmundson's 7% Pref.	1	7	7	32/-	—	4 7 6
Elec. Dis. Yorkshire	1	9	9	46/3	+6d.	3 17 8
Elec. Supply Corporation	1	11	11	74/6	+2/-	2 19 2
Kensington Ordinary	1	8	7	32/6	—	4 6 2
Lancs Light and Power	1	7	7	35/-	+⅛	4 0 0
London Electric	1	9	7	32/6	—	4 6 2
Metropolitan	1	10	10	50/-	—	4 0 0
Midland Counties	1	7	7	35/-	—	4 0 0
Mid. Elec. Power	1	8	8	39/6	—	4 1 0
North Eastern Electric Ordinary	1	6	6	32/-	—	3 15 0
Do. 7% Pref.	1	7	7	32/6	—	4 6 2
Northampton	1	10	10	51/3	—	3 17 6
Notting Hill 6% Pref.	10	6	6	13	—	4 12 4
North Met. Elec. 6% Pref.	1	6	6	29/-	—	4 2 9
St. James' and Pall Mall	1	8	7	33/-	—	4 4 10
Scottish Power	1	8	8	38/3	+9d.	4 3 9
South London	1	8½	7	33/-	—	4 4 10
Urban 6% Pref.	1	6	6	29/-	—	4 2 9
Westminster Ordinary	1	8½	7	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/3	+6d.	7 1 2
Yorkshire Elec.	1	8	8	44/6	+9d.	3 12 3
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	109	—	4 11 9
Do. 1951–73	„	4½	4½	107	—	4 4 1
Do. 1963–93	„	—	3½	92	—½	3 16 1
London & Home Counties, 1955–75	„	4½	4½	107	—	4 4 1
London Passenger Transport, A	„	—	4½	114½	+½	3 18 7
Do. do. B	„	—	5	119	+1	4 4 0
Do. do. C	„	—	—	81	+1	—
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	142½	—	6 6 4
Anglo-Am. Tel. Pref.	Stock	6	6	111½	—	5 7 7
Do. Def.	„	1½	1½	28	—	5 5 3
Cables & Wireless 5½% Pref.	„	2¾	2¾	83½	—	3 5 10
Do. A 7½% Ord.	„	Nil	Nil	30	—½	—
Do. B Ord.	„	Nil	Nil	14	—	—
Globe Tel. and T. Ord.	10	Nil	2½	11¼	—½	2 2 1
Do. do. Pref.	10	6	6	12¾	—½	4 17 0
Great Northern Tel.	10	20	20	31½	—	6 8 0
Marconi-Marine	1	10	7½	33/0	—	4 9 0
Oriental Telephone Ord.	1	12	12	2⅞	—	*4 3 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	4/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/3	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	10½	—	—
British Electric Traction Df. Ord.	„	5	5	475	+35	—
Do. do. Pref. Ord.	„	8	8	142½	—	5 12 3
Brazil Traction	100	—	—	15⅛	+⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	100½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	20/-	—	—
Mexico Trams, 5% Bonds	—	5	5	27½	—	18 3 8
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	55	—	9 1 10
Victoria Falls Ord.	1	15	20	97/6	—	4 2 0
Yorkshire (West Riding)	1	Nil	Nil	11/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	4	21/3	—	3 15 1
Do. Pref.	1	8	8	30/9	—	5 4 2
Babcock & Wilcox	1	14	9	38/3	+1/3	4 19 3
British Aluminium Ord.	1	5	5	31/3	—	3 4 0
British Insulated Ord.	1	15	15	71/3	—	4 2 4
Brush Ord.	Stock	Nil	Nil	35	—	—
Callender's	1	15	15	3¾	—	4 16 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	22½	—	18/3	—	6 5 7
Do. 8% Pref.	1	8	8	28/9	—⅛	5 11 4
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	92/6	+6d.	5 8 3
English Electric	1	Nil	Nil	10/-	—	—
Do. do. Pref.	1	Nil	Nil	15/-	—	—
Ever Ready	5/-	35	35	27/9	—	6 16 0
Ferranti Pref.	1	7	7	25/9	+9d.	5 8 9
G.E.C. Pref.	1	6½	6½	29/-	—	4 9 8
Do. Ord.	1	8	8	43/9	—	3 13 2
Henley's	1	30	30	6¾	—	4 14 4
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	5	5	22/-	—	4 11 0
Siemens Ord.	1	7½	6½	24/6	—	5 6 0
Telegraph Construction	£1	Nil	Nil	22/6	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1932

1462. "Method of electrolysis with the use of a mercury cathode." K. W. Palmaer. April 30th, 1931. (396415.)
2480. "Wireless receiving apparatus." F. M. Hills and J. S. Faulkner. January 27th, 1932. (396436.)
2635. "Suspension clamps for electric conductors or cables." British Aluminium Co., Ltd., and E. T. Painton. January 28th. 1932. (396397.)
2753. "Cathode-ray apparatus." W. R. Bullimore and L. H. Bedford. January 29th, 1932. (396422.)
3007. "Electro-acoustic devices." Electrical Research Products, Inc. February 5th, 1931. (396387.)
3022. "Traffic signal posts." W. Bremer and F. Faber. February 2nd, 1931. (396391.)
3124. "Electric water-heating arrangements." A. Reyrolle & Co., Ltd., F. N. Linstow and T. Ritson. February 2nd, 1932. (396404.)
3142. "Voltage regulators." Ferranti, Ltd., and E. D. T. Norris. February 2nd, 1932. (396408.)
3154. "Control of d.c. electric motors." F. Whyman and Associated Electrical Industries, Ltd. February 2nd, 1932. (396410.)
3279. "Method for the electro-acoustical reproduction of oscillations." M. Von Ardenne. February 12th, 1931. (396440.)
3366. "Television receivers." Marconi's Wireless Telegraph Co., Ltd., and R. Cadzoe. February 4th, 1932. (396442.)
3369. "Terminating circuits for two-way electrical signalling systems." Electrical Research Products, Inc. February 24th, 1931. (396443.)
3370. "Transmission systems such as long-distance telephone systems." Electrical Research Products, Inc. February 24th, 1931. (396444.)
3380. "Electrically operated elevators, lifts, and like installations." K. W. D. Roberts and Associated Electrical Industries, Ltd. February 4th, 1932. (396445.)
3975. "Electrical insulators, electrical condensers, and the like." A. F. Fakete. February 10th, 1931. (396453.)
4021. "Light valves." Electrical Research Products, Inc. February 27th, 1931. (396455.)
4755. "Electric incandescent filament lamps." A. E. Chapman. February 17th, 1932. (396465.)
6684. "Systems of electric motor control." International General Electric Co., Inc. March 7th, 1931. (396475.)
7565. "Leakage indicators and protective cut-out arrangements for alternating current circuits." British Power Railway Signal Co., Ltd., S. L. Glenn and E. E. Pierce. March 14th, 1932. (396481.)
7920. "Electric burglar alarm systems." L. Hyman, W. E. Oughton, and B. E. Hyman. March 7th, 1932. (Cognate application 13643/32.) (396485.)
8229. "Heavy duty circuit breakers." H. Astbury and Crompton Parkinson, Ltd. March 19th, 1932. (396488.)
9611. "Automatic telephone systems." Siemens Bros. & Co., Ltd., W. G. Patterson and D. P. Long. April 4th, 1932. (396494.)
10363. "Electrically driven mills for grinding coffee and the like." Lancashire Dynamo & Crypto, Ltd., and F. H. Schroeder. April 11th, 1932. (396496.)
13562. "Electron emitters and the manufacture of the same." A.C. Spark Plug Co. May 11th, 1931. (396514.)
14787. "Electric plug-and-socket couplings or the like." G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce. May 25th, 1932. (396520.)
14869. "Electric batteries." Ever Ready Co. (Great Britain), Ltd., and M. Van Koningsveld. May 25th, 1932. (396521.)
15844. "Thermionic valves." B. Erber and A. Schwitzer (trading as G. Ganz & Co.). July 11th, 1931. (Addition to 371419.) (396527.)
17952. "Electromagnetic relays." General Electric Co., Ltd., and C. C. Puckette. June 25th, 1932. (396536.)
20146. "Automatic control gear for intermittent operation of reversing electric motors." I. Braithwaite & Son, Engineers, Ltd., and W. Banks. July 16th, 1932. (396548.)
24944. "Sparking plugs and like ignition devices." Dr. H. Navratiel. September 7th, 1931. (396567.)
28922. "Television transmission method." M. Von Ardenne. October 24th, 1931. (396580.)
29507. "Electric discharge lamps and apparatus therefor." W. J. L. Chinn. October 21st, 1931. (396582.)
34066. "Electric ignition apparatus for combustion engines." R. Chefneux and M. Chefneux. December 2nd, 1931. (396597.)
34694. "Fluorescent screen." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. December 16th, 1931. (Addition to 372827.) (396601.)

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893. "Portable electric grinding machines." R. Bosch Akt.-Ges. January 23rd, 1932. (396619.)
1557. "Dial switches for use in telephone systems." Telephon-Apparat-Fabrik. E. Zweitusch & Co. Ges. March 4th, 1932. (396626.)
2025. "Flash-light lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 4th, 1932. (396411.)
2201. "Elevator systems." Westinghouse Electric & Manufacturing Co. January 23rd, 1932. (396629.)
12402. "Electric storage batteries." N. D. Sturges. April 28th, 1933. (396668.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 23rd, except in the case of the mark "Prestige," the month in respect of which dates from August 16th :—

Twinil. No. 540309. Class 8. Radio-telephonic receiving and transmitting apparatus and parts thereof.—England-Richards Fluid-Free Cell Co., Ltd., Waterloo Street, King's Lynn, Norfolk.

W.B., Whiteley Electrical Radio Co., Ltd., Radio Works, Mansfield, Notts (lettering and design). No. 540563. Class 8. Instruments and apparatus and parts thereof for use in radio-telegraphy and telephony.—Whiteley Electrical Radio Co., Ltd., Victoria Street, Mansfield, Notts.

Bush Ranger. No. 542772. Class 8. Radio-telephone receiving and transmitting sets.—Bush Radio, Ltd., 142-150, Wardour Street, W.1.

Módula. No. 543160. Class 8. Radio-telephone apparatus and parts thereof.—British Pix Co., Ltd., 118, Southwark Street, S.E.1.

Receptru (lettering and design). No. 541193. Class 13. Insulated electric lead-in conductors for radio-receiving sets.—British Radiophone, Ltd., 56, Vicarage Lane, Ilford, Essex.

Prestige. No. 542123. Class 13. Electric switches, plug and socket couplings, fuses, switch-fuses, bell pushes, adaptors, lampholders, ceiling roses, wall boxes and fittings therefor, electric conduits, conduit fittings and electric irons, all being metal goods.—J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall.

Meminx. No. 543179. Class 13. Electric switches, combined switches and fuses, and electric fusible cutouts.—Midland Electric Manufacturing Co., Ltd., Barford Street, Birmingham.

Rill. No. 542171. Class 18. Electric and gas heating and cooking apparatus.—Fletcher, Russell & Co., Ltd., Palatine Works, Wilderspool Causeway, Warrington.

Shellit. No. 540603. Class 50. Artificial resin sold in sheets and blocks for industrial purposes.—Kesslers (London), Ltd., 15-16, Richmond Street, E.C.1.

Electrical Benevolence

At a gathering in London last week Lord Meston, the president of the Electrical Industries Benevolent Association, expressed the opinion that the contributions to the Association's funds were totally incommensurate with the industry's size, wealth and importance. He pointed out that although something like £1,000,000,000 was invested in the various branches (the supply section alone accounting for about £335,000,000), the total receipts of the Association last year were only £3,367. The Institution of Electrical Engineers with 15,000 members managed to collect about £2,500 annually.

The president said that there was a tendency, even among electrical men, to take things for granted. The great human army of which the industry was composed had many casualties. Through no fault of their own many men found themselves in great need or they left dependants penniless. For these the Association was doing a great deal, within the limits imposed upon it by its meagre funds, in a quiet, unostentatious and human way. The members of the Executive Committee devoted a great deal of time and trouble to the affairs of the Association, and the Relief Committee was in permanent session.

Through the invaluable work of Mr. R. P. Sloan there were now nine branches in existence. Many hundreds of new members had joined during the past year, principally of the associate-member class, but there were still thousands who were in a position to become members and should do so. Mr. J. P. Wooller (Beckenham Electricity Department) had been appointed to the Executive Committee as representative of the associate members.

A penny collection fund was being launched as a means of augmenting the income. Mr. J. Y. Fletcher had presented a mould for the production of collection plates bearing the Association's badge (see illustration) and had also given the first four hundred plates. These would be in evidence wherever electrical men forgathered, and those present would be asked to put a penny in the plate. This ought to add a considerable amount to the funds of the Association in the course of a year.

The E.I.B.A. penny collection plate

The receipt for the subscription was now being sent in a neat burr walnut "Bakelite" frame, the front of the receipt bearing the Association's badge. The frame could be hung upon the wall of an office to serve as a reminder of the Association's existence and its needs.

The Association's ball was to be held on November 23rd, when it was hoped that as many members as possible would attend and bring their friends. The secretary of the Association is Capt. J. T. Keeping and its address is 9, Southampton Street, Holborn, W.C.1.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Houses (253); city architect.
Aberystwyth.—Houses (18); borough surveyor.
Alnwick.—Houses (44), Clayport Gardens Estate; U.D.C. surveyor.
Alum Rock (NEAR BIRMINGHAM).—Parish church (£10,000); C. Tunstall, secretary.
Ashton-in-Makerfield.—Houses (60); H. Busby, U.D.C. surveyor.
Banbury.—Houses (40), Warwick Road; S. G. Marsh, builders, Hobmoor Road, Yardley, Birmingham.
Barnsley.—Houses (95), Burton Grange, &c. Extensions, maternity home; borough engineer.
Bedlington.—Spiritualist church; E. J. Philipson & Son, builders, Bedlington Colliery.
Bexhill-on-Sea.—Extensions, Normanhurst Hotel (£3,000), with electrical work; E. Bunce, architect, 21, Sea Road.
Bideford.—Public baths (£6,000); borough surveyor.
Birmingham.—Church, Golden Hillock Road, Small Heath, for the Four Square Gospel Alliance (£8,000); S. G. Ward, builders, Charminster Road, Bournemouth.
Burnham (BUCKS).—Houses (22), Alvista Avenue, for F. W. West.
Burnley.—Premises, Brunshaw, for Burnley Equitable & Industrial Co-operative Society, Ltd.; Mullen & Durkin, Ltd., contractors, Trafalgar Street.
Buxton.—Conversion of Crescent Hotel into cinema (£10,000); R. T. Longden and W. J. Venables, architects, 20, Stafford Street, Hanley, Stoke-on-Trent.
Carlisle.—Masonic temple, Portland Square; S. W. B. Jack, architect, Lloyds Bank Chambers. Church, Raffles; J. Seeley and Paul Paget, architects, 41, Cloth Fair, London.
Colchester.—Public library, fire station, and repair depôt; F. R. O'Neill Smyth, borough surveyor.
Coal Aston (DERBYSHIRE).—Houses (18), Drury Lane; T Ward.
Colwyn Bay.—Entertainment centre, with concert hall and restaurant café, Rydal Gardens; U.D.C. surveyor.
Croydon.—Restaurant, banqueting hall, ball room, &c, for Café de Paris (Croydon), Ltd.; Anspach Trust Co., 14, Fenchurch Street, E.C.
Darlington.—Houses (62); J. W. Richardson, builder, Quebec Street, Darlington. Alterations to North Eastern Hotel; T Stairmand & Sons, builders, Andrew Street.
Datchet.—Works, Waterworks Field; Lane Bros.
Dewsbury.—Houses (15), North Street; Mitchell Bros.
Doncaster.—Houses (61); borough engineer, 2, Priory Place.
Droitwich.—Extensions, Dragoon Hotel, Aston Fields, for Ind Coope & Co. (£5,000); H. W. Hobbiss, architect, 33, Newhall Street, Birmingham. Rebuilding, Salter's Hill (£8,000), with electrical work; H. Robinson, architect, 6, Cherry Street, Birmingham.
Dundee.—Alterations to South Anchor Jute Works; Gauldie, Hardie & Sharpe, architects, 26, Commercial Street.
Dunfermline.—Houses (44); burgh surveyor.
East Horsley (SURREY).—Development of Surrey Garden Estate; E. J. Searle.
Edinburgh.—Houses (48); J. Miller, builder, 88, Hanover Street.
Effingham (SURREY).—Development of Lee Woods Estate (268 acres); H. W. Perry & Daw.
Ely.—Houses (28), New Barnes site; A. E. King, U.D.C. surveyor.
Fenton (STAFFS).—Land development, off Whieldon Road, for Bates & Hughes; F. E. Lawson, architect.
Formby.—Houses (360), with electrical work; J. W. Stevens.
Gillingham (KENT).—Block of flats, Manor Street, Brompton; J. L. Redfern, borough engineer.
Glasgow.—Premises, Hope Street and Wellington Lane; Associated Scottish Newspapers, Ltd.
Guildford.—Extensions, Council Offices, Millmead House; R.D.C. surveyor.
Hartshorne and Seals.—Houses (30), with electrical work; Goddard & Wain, architects, Station Chambers, High Street, Coalville.
Hasland (DERBYSHIRE).—Development of Hasland Hall Estate; Wilcock and Cutts.
Herne Bay.—Estate development, Bishopstone Manor, for Newell & Burgess.
Hindhead.—Houses (24), Haslemere; U.D.C. surveyor.
Horncastle.—Extensions, casual wards (£4,372); T. Roper & Sons, Ltd., Sheffield.
Howdon-on-Tyne.—Shops for A. Lisle & Sons, builders, Whitley Bay.
Irish Free State.—(KILKENNY).—Boot factory, for Padmore & Barnes (Ireland), Ltd.; M. J. Crotty, solicitor, Parliament Street.
Irlam.—Estate development, Silver Street; J. H. Sharp.
Kingston-on-Thames.—Flats (300), London Road; Norbiton Hall Estate. Six shops, Richmond Road; Partridge & Daniel.
Kirkcaldy (FIFE).—Houses (92), with electric lighting; burgh surveyor.
Lampeter.—Post office; Davies Bros., builders, Cardiff.
Lanarkshire.—Houses (28), Carfin (electrical work); P. C. Smith, architect, 13, Clydesdale Street, Hamilton.
Lancaster.—Extensions to central premises for Lancaster and District Co-operative Society (£26,000); R. W. Jackson, architect, 43, Church Street, Lancaster.
Liskeard (CORNWALL).—Cinema; Vanstone & Taylor.
Lincoln.—St. Giles' Church; W. G. Watkins, architect, St. Edmund's Chambers, Silver Street.
Liverpool.—Junior and infant school, Knotty Ash (£8,000), for Catholic Authorities; John Williams (Liverpool), Ltd., builders, 70, Collingwood Street.
London.—(EALING).—Factory, Bulton Road; J. B. Borer, solicitor. Development of Greystoke Estate for London & Provincial Building Co., Ltd.; S. H. West, architect, 40, The Broadway, W.5. Factories, Chase Estate, for Allnatt, Ltd.; R. E. Simpkins, architect. Shops and flats, Horsenden Lane, Kidneys Farm; North, Robin & Wilsdon. (HOLBORN).—Business premises and flats, Little Warl Street; Trehearne, Norman, Preston & Co. (LEWISHAM).—Offices, High Street, for Liverpool Victoria Friendly and Approved Societies; Ashby & Horner, Ltd., builders, 8, Aldgate, E. (LEYTON).—Three shops, Church Lane, and extensions, *Express* newspaper offices; R. C. Clark. (WALTHAMSTOW).—Houses (124), Bridge Road; Partridge & Daniel. Houses (66), Farm Lodge Estate; J. W. Warboys. Estate development, adjoining St. Mary's Church; J. Trevor & Sons. Factory extension, St. Andrew's Mills, Higham Hill; Humphreys, Ltd. Factory, Salisbury Hall Estate; Thomas de la Rue & Co. Library, Highams Park; borough engineer. Elementary school, Thorpe Hall site; borough engineer. Alterations, 350, Hoe Street; London Co-operative Society, Ltd.
Long Ashton.—Houses (20), Yatton; R.D.C. surveyor.
Louth.—Hospital (£60,000); Lincolnshire C.C.
Mansfield.—Methodist church and school, Big Barn Lane; Rogers & Crookes, Ltd., builders, Victoria Street.
Mildenhall.—Re-housing scheme (50); W. H. Mitchell, architect, Bury St. Edmund's.
Mitcham.—Houses (55), D'Arn Gardens; G. V. Dearn. Houses (99), Morden Road; Dawsley, Ltd. Houses (48), Pear Tree Estate (£15,100); Unit Construction Co., Ltd.
New Malden.—Houses (23), Cambridge Road; Clifford & Clifford. Baths; A. W. S. & K. M. B. Cross, U.D.C. architects.
Oxford.—Extensions, Ashmoleum Museum, Beaumont Street; Oxford University. Additions, Botanic Buildings, High Street; Magdalen College trustees.
Padiham (LANCASHIRE).—Public offices, hall, and baths, Bridge End Mill; U.D.C. surveyor.
Paignton.—Shopping centre, Wadderton Post; D. M. Waterman.
Penkridge (STAFFORD).—Methodist Church, Clay Street (£3,000); Walker & Sons, builders, Cannock.
Reigate.—Shopping centre, Bell Street; Paxton Watson, architect, Chandos House, Buckingham Gate, London, S.W.
Ryhope (DURHAM).—Pithead baths (£30,000); J. H. Forshaw, architect to the Miners' Welfare Committee, S.W.1.
Saffron Walden.—Houses, allotment site; borough engineer.
Seaton Delaval.—Houses (22), New Hartley; A. Dorin, U.D.C. surveyor.
Seghill.—Houses (20), for U.D.C.; William Turner, builder, 22, Oaktree Avenue, Walkerville, Newcastle.
Selly Oak (BIRMINGHAM).—Conversion of Bournbrook Electric Cinema into factory for Ariel Works, Ltd. (£3,000); Dallow & Sons, builders, Blackheath.
Smethwick (STAFFS).—Eight shops, Hurst Road; W. S. Walker, builders, Olton Road, Shirley, Birmingham.
South Africa.—(CAPE TOWN).—Slum clearance and rehousing (£800,000); city engineer.
South Darenth (KENT).—Development of East Hill Estate; J. R. Mitchell, 74, Spital Street, Dartford.
Southwick.—School, Kingston Lane; West Sussex county architect, Chichester.
Spilsby.—Gymnasium, assembly hall, &c., Grammar School; governors.
Stafford.—Development of Park House Estate; W. Whittingham. Premises, Sandon Road; Stafford Boot & Shoe Operatives.
Stevenage.—Public baths (£3,000); U.D.C. surveyor.
Stirling.—Business stores, Drip Road, for Co-operative Society, Ltd.; secretary.
Stoke-on-Trent.—Houses (162), Trent Vale and Penkhull; city surveyor.
Stratford-on-Avon.—Houses, Aspley Heath (£3,500); Johnson & Newton.
Stroud (GLOS).—Offices and headquarters, Stroud Holloway Original Benefit Society; V. S. Barnes, architect.
Surrey.—Junior school (298 places), Grand Avenue, Tolhurst; county architect, Kingston-on-Thames.
Swansea.—Houses (300), Townhill Estate; E. C. Morgan, architect, 3, Prospect Place.
Tavistock.—Rehousing scheme, Parkwood Road; U.D.C. surveyor.
Teddington.—Completion of Catholic Church (£4,800); Rev. Philip Foley.
Thornton Cleveleys.—Houses (16), Stanley Avenue; W. Eastwood. Motor fuel factory, Burn Naze; Maudslie Engineering Co. Shops, 61-2, Rossall Road; C. Higgins.
Thrapston.—Cinema, Bridge Street; C. R. Pettit & Son, builders, Bridge Street.
Tilbury.—Factory, 20 houses, and boiler house, for the Bata Shoe Co.; W. E. Walsham, Ltd., builders, Grays.
Trentham (STAFFS).—Development off Brough Lane, for Cooper & Jones; Beckett & Bloore, architects.
Truro (CORNWALL).—Library; county architect.
Wallasey.—Baths, New Brighton (£61,993); W. Tomkinson & Sons, Liverpool. Branch libraries (£9,500); borough engineer.
Walsall.—Premises for True Form Boot Co., Ltd., Park Street (£2,300); borough engineer.
Warrington.—Houses (146), Westy Lane Estate; A. M. Ker, borough engineer. Pelican Hotel, Buttermarket Street, for Greenall, Whitley & Co., Ltd.; Brew Brothers, builders, Cadishead.
Washington (CO. DURHAM).—Houses (56); R. J. Swaddle, surveyor, Council Offices.
Wednesbury.—Houses (16), Queen Street, Moxley; A. Booth, borough engineer, Town Hall.
Wells (SOMERSET).—Houses (20); city surveyor.
Whiston.—Houses (36), for R.D.C.; Gornall and Wainwright, architects, 17, George Street, St. Helens.
Wideopen (NORTHUMBERLAND).—Houses (24); G. Robertson and Son, builders, 16, West View.
Wigan.—Houses (104), Pemberton; W. A. Walker, borough engineer, Municipal Buildings, Library Street.